Cerebral Palsy Alliance

NEWS
Cerebral Palsy Research

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Professor Nadia Badawi AM
Macquarie Group Foundation Chair of Cerebral Palsy

Interventions and Management

1. Dev Med Child Neurol. 2014 Sep 19. doi: 10.1111/dmcn.12589. [Epub ahead of print]

The influence of early modified constraint-induced movement therapy training on the longitudinal development of hand function in children with unilateral cerebral palsy.

Eliasson AC1, Holmefur M.

AIM: There is evidence that modified constraint-induced movement therapy (mCIMT) has a short-term positive effect on hand function in children with unilateral cerebral palsy (CP), but the long-term effect is unknown. The aim of this study was to investigate whether or not a single block of mCIMT (2h/d for 2mo) at age 2 to 3 years influences the course of development of bimanual hand function at around 8 years of age. METHOD: A convenience sample of 45 children (24 males, 21 females) with unilateral CP and mean (SD) age at first assessment 32 months (13mo) was included in this study. The participants were divided into the mCIMT group (n=26) and the reference group (no mCIMT; n=19). Brain lesion characteristics were available for 32 children. The children were measured repeatedly with the Assisting Hand Assessment (AHA) for a mean period of 4 years and 6 months. Development curves were created and compared with a non-linear mixed effects model. RESULTS: Children who were receiving mCIMT had an upper limit of development of bimanual hand function that was 8.5 AHA units higher than in the reference group (p=0.022). However, when controlling for brain lesion characteristics and baseline in a subgroup of 32 children, the difference was considerably smaller and no longer significant. mCIMT may have a positive impact on long-term development of bimanual hand function, but the results are inconclusive and further research is necessary.

PMID: 25236758 [PubMed - as supplied by publisher]

2. Disabil Rehabil. 2014 Sep 26:1-7. [Epub ahead of print]

Mastery motivation: a way of understanding therapy outcomes for children with unilateral cerebral palsy.

Miller L1, Ziviani J, Ware RS, Boyd RN.

Purpose: To investigate the impact of mastery motivation on occupational performance outcomes immediately following upper limb (UL) training and 6 months post-intervention for school-aged children with unilateral cerebral palsy. Method: This prediction study was a post-hoc analysis of a matched pairs randomized comparison trial

(COMBiT Trial Registration: ACTRN12613000181707). The Canadian Occupational Performance Measure (COPM) was administered at baseline, 13 and 26 weeks post-intervention. Parents completed the Dimensions of Mastery Questionnaire (DMQ), Parenting Scale and a demographic questionnaire. Children's UL capacity and performance was assessed using the Melbourne Assessment of Unilateral UL Function and assisting hand assessment (AHA). Regression models were fitted using generalized estimating equations to baseline, 13 and 26 week measurements. Results: Forty-six children (7.78 years SD 2.27 years, 31 males, Manual Ability Classification System I = 23, II = 23) participated. Higher levels of bimanual performance (AHA: β=0.03, p < 0.001), greater object-oriented persistence (DMQ: β=0.31, p = 0.05), and treatment group allocation (Standard Care: β=0.24, p = 0.01) were positively associated with COPM performance scores post-intervention. Conclusions: Children's bimanual performance and persistence with object-oriented tasks significantly impact occupational performance outcomes following UL training. Predetermining children's mastery motivation along with bimanual ability may assist in tailoring of intervention strategies and models of service delivery to improve effectiveness. Implications for Rehabilitation Children's object persistence and bimanual performance both impact upper limb training outcomes Working with children's motivational predispositions may optimize engagement and therapy outcomes. Supporting positive parenting styles may enhance a child's mastery motivation and persistence with difficult tasks.

PMID: 25259559 [PubMed - as supplied by publisher]

3. PM R. 2014 Sep 19. pii: S1934-1482(14)01383-5. doi: 10.1016/j.pmrj.2014.09.009. [Epub ahead of print]

Surface Electromyography of Wrist Flexors and Extensors in Children with Hemiplegic Cerebral Palsy.

Xu K1, Mai J2, He L3, Yan X4, Chen Y4.

OBJECTIVE: To investigate the characteristics of motor unit recruitment and coordination function of the wrist during maximum isometric voluntary contraction (MIVC) using surface electromyography (EMG) in children with hemiplegic cerebral palsy. DESIGN: A cross-sectional trial. SETTING: Hospital neurology and rehabilitation department. PARTICIPANTS: Sixty-eight children with spastic hemiplegic cerebral palsy. METHODS: The signals of wrist flexors and extensors in unaffected and affected hands of children with hemiplegic cerebral palsy were measured with surface EMG. The characteristics of integrated EMG (iEMG), root mean square (RMS) and co-contraction ratio of surface EMG were analyzed. RESULTS: The RMS and iEMG in the affected hand during MIVC were higher than that of the unaffected hand (p<.001). The RMS and iEMG of wrist extensors and the iEMG of wrist flexors of the affected hand had a good correlation with the unaffected hand (p<.01). The RMS and iEMG of the unaffected hand during MIVC were higher than that of the affected hand (p<.001), the iEMG of the unaffected hand had a good correlation with the affected hand (p<.05). The RMS and iEMG in the unaffected hand during MIVC were significantly higher than that of the affected hand during MIVC (p<.001). The co-contraction ratio of the unaffected hand was significantly lower than that of the affected hand (p<.001). CONCLUSIONS: The affected side shows more co-contractions than the unaffected side in children with hemiplegic cerebral palsy. However, the unaffected side demonstrates stronger motor unit recruitment at maximal effort than the affected side. In addition, this study also demonstrates a successful method to use surface EMG for assessment of motor unit activation in young children with cerebral palsy.

PMID: 25244997 [PubMed - as supplied by publisher]

4. Int J Neural Syst. 2014 Jul 2:1450022. [Epub ahead of print]

Extraction of neural control commands using myoelectric pattern recognition: a novel application in adults with cerebral palsy.

Liu J1, Li X, Marciniak C, Rymer WZ, Zhou P.

This study investigates an electromyogram (EMG)-based neural interface toward hand rehabilitation for patients with cerebral palsy (CP). Forty-eight channels of surface EMG signals were recorded from the forearm of eight adult subjects with CP, while they tried to perform six different hand grasp patterns. A series of myoelectric pattern recognition analyses were performed to identify the movement intention of each subject with different EMG feature

sets and classifiers. Our results indicate that across all subjects high accuracies (average overall classification accuracy > 98%) can be achieved in classification of six different hand movements, suggesting that there is substantial motor control information contained in paretic muscles of the CP subjects. Furthermore, with a feature selection analysis, it was found that a small number of ranked EMG features can maintain high classification accuracies comparable to those obtained using all the EMG features (average overall classification accuracy > 96% with 16 selected EMG features). The findings of the study suggest that myoelectric pattern recognition may be a useful control strategy for promoting hand rehabilitation in CP patients.

PMID: 25245096 [PubMed - as supplied by publisher]

5. Res Dev Disabil. 2014 Sep 18;35(12):3568-3573. doi: 10.1016/j.ridd.2014.08.033. [Epub ahead of print]

Seat surface inclination may affect postural stability during Boccia ball throwing in children with cerebral palsy.

Tsai YS1, Yu YC2, Huang PC3, Cheng HY4.

The aim of the study was to examine how seat surface inclination affects Boccia ball throwing movement and postural stability among children with cerebral palsy (CP). Twelve children with bilateral spastic CP (3 with gross motor function classification system Level I, 5 with Level II, and 4 with Level III) participated in this study. All participants underwent pediatric reach tests and ball throwing performance analyses while seated on 15° anterior- or posterior-inclined, and horizontal surfaces. An electromagnetic motion analysis system was synchronized with a force plate to assess throwing motion and postural stability. The results of the pediatric reach test ($p=0.026$), the amplitude of elbow movement ($p=0.036$), peak vertical ground reaction force (PVGRF) ($p<0.001$), and movement range of the center of pressure (COP) ($p<0.020$) were significantly affected by seat inclination during throwing. Post hoc comparisons showed that anterior inclination allowed greater amplitude of elbow movement and PVGRF, and less COP movement range compared with the other inclines. Posterior inclination yielded less reaching distance and PVGRF, and greater COP movement range compared with the other inclines. The anterior-inclined seat yielded superior postural stability for throwing Boccia balls among children with bilateral spastic CP, whereas the posterior-inclined seat caused difficulty.

PMID: 25241116 [PubMed - as supplied by publisher]

6. Acta Ortop Bras. 2014;22(4):197-201.

Most frequent gait patterns in diplegic spastic cerebral palsy.

de Morais MC Filho1, Kawamura CM2, Lopes JA1, Neves DL1, Cardoso MD2, Caiafa JB2.

OBJECTIVE: To identify gait patterns in a large group of children with diplegic cerebral palsy and to characterize each group according to age, Gross Motor Function Classification System (GMFCS) level, Gait Deviation Index (GDI) and previous surgical procedures. METHODS: ONE THOUSAND EIGHT HUNDRED AND FIVE PATIENTS WERE DIVIDED IN SEVEN GROUPS REGARDING OBSERVED GAIT PATTERNS: jump knee, crouch knee, recurvatum knee, stiff knee, asymmetric, mixed and non-classified. RESULTS:
The asymmetric group was the most prevalent (48.8%). The jump knee (9.6 years old) and recurvatum (9.4 years old) groups had mean age lower than the other groups. The lowest GDI (43.58) was found in the crouch group. There were more children classified within GMFCS level III in the crouch and mixed groups. Previous surgical procedures on the triceps surae were more frequent in stiff knee and mixed groups. The jump knee group received less and the stiff-knee group more surgical procedures at hamstrings than others. CONCLUSIONS: The asymmetrical cases were the most frequent within a group of diplegic patients. Individuals with crouch gait pattern were characterized by the lowest GDI and the highest prevalence of GMFCS III, while patients with stiff knee exhibited a higher percentage of previous hamstring lengthening in comparison to the other groups. Level of Evidence III, Retrospective Comparative Study.

PMID: 25246849 [PubMed - as supplied by publisher] PMCID: PMC4167043 Free PMC Article

7. Clin Rehabil. 2014 Sep 25. pii: 0269215514547654. [Epub ahead of print]

Effect of backward walking training on postural balance in children with hemiparetic cerebral palsy: a randomized controlled study.

El-Basatiny HM1, Abdel-Aziem AA2.

OBJECTIVE: To study the effect of additional backward walking training on postural control in children with hemiparetic cerebral palsy. DESIGN: Randomized controlled study. SETTING: Physical therapy clinics. SUBJECTS: Thirty spastic hemiparetic cerebral palsied children of both sexes (10-14 years, 14 girls and 16 boys). INTERVENTION: Children were randomly assigned into two equal groups: experimental and control groups. Both groups received a traditional physical therapy program for 12 weeks. Experimental group additionally received backward walking training which was provided 25 min/day, 3 days/week for 3 successive months. OUTCOME MEASURES: Baseline and post-treatment assessment for overall, anteroposterior, and mediolateral stability indices were evaluated by using Biodex balance system. RESULTS: After treatment; two way ANOVA revealed significant improvement in overall, anteroposterior and mediolateral stability indices of experimental group at the most stable level (level 12) and moderately unstable level (level 7) (1.40 ± 0.44 and 1.73 ± 0.51; 1.11 ± 0.34 and 2.13 ± 0.52; 1.93 ± 0.51 and 2.68 ± 0.52) respectively, than control group (1.77 ± 0.44 and 2.17 ± 0.56; 1.44 ± 0.44 and 2.54 ± 0.49; 2.39 ± 0.65 and 3.11 ± 0.49) respectively, ($P < 0.05$). There were significant improvement in all measured variables for both groups at both levels ($P < 0.05$). CONCLUSION: Additional backward walking training to traditional physical therapy program yields improvement in postural stability indices in children with spastic hemiparetic cerebral palsy than traditional physical therapy alone.

PMID: 25258425 [PubMed - as supplied by publisher]

8. J Orthop Res. 2014 Sep 19. doi: 10.1002/jor.22728. [Epub ahead of print]

High resolution muscle measurements provide insights into equinus contractures in patients with cerebral palsy.

Mathewson MA1, Ward SR, Chambers HG, Lieber RL.

Muscle contractures that occur after upper motor neuron lesion are often surgically released or lengthened. However, surgical manipulation of muscle length changes a muscle's sarcomere length (Ls), which can affect force production. To predict effects of surgery, both macro- (fascicle length (Lf)) and micro- (Ls) level structural measurements are needed. Therefore, the purpose of this study was to quantify both Ls and Lf in patients with cerebral palsy (CP) as well as typically developing (TD) children. Soleus ultrasound images were obtained from children with CP and TD children. Lf was determined and, with the joint in the same position, CP biopsies were obtained and formalin fixed, and Ls was measured by laser diffraction. Since soleus Ls values were not measurable in TD children, TD Ls values were obtained using three independent methods. While average Lf did not differ between groups (CP = 3.6 ± 1.2 cm, TD = 3.5 ± 0.9 cm; $p > 0.6$), Ls was dramatically longer in children with CP (4.07 ± 0.45 μm vs. TD = 2.17 ± 0.24 μm; $p < 0.0001$). While Lf values were similar between children with CP and TD children, this was due to highly stretched sarcomeres within the soleus muscle. Surgical manipulation of muscle-tendon unit length will thus alter muscle sarcomere length and change force generating capacity of the muscle. © 2014 Orthopaedic Research Society. Published by Wiley Periodicals, Inc. J Orthop Res.

PMID: 25242618 [PubMed - as supplied by publisher]

9. J Pediatr Rehabil Med. 2014 Jan 1;7(3):233-40. doi: 10.3233/PRM-140292.

Measuring reliability and validity of the ActiGraph GT3X accelerometer for children with cerebral palsy: A feasibility study.

O'Neil ME1, Fragala-Pinkham MA2, Forman JL3, Trost SG4.

PURPOSE: The purposes of this study were to: 1) establish inter-instrument reliability between left and right hip accelerometer placement; 2) examine procedural reliability of a walking protocol used to measure physical activity (PA); and 3) confirm concurrent validity of accelerometers in measuring PA intensity as compared to the gold standard of oxygen consumption measured by indirect calorimetry. METHODS: Eight children (mean age: 11.9; SD: 3.2, 75% male) with CP (GMFCS levels I-III) wore ActiGraph GT3X accelerometers on each hip and the Cosmed K4b<formula>^{2}</formula> portable indirect calorimeter during two measurement sessions in which they performed the six minute walk test (6MWT) at three self-selected speeds (comfortable/slow, brisk, fast). Oxygen consumption (VO2) and accelerometer step and activity count data were recorded. RESULTS: Inter-instrument reliability of ActiGraph GT3X accelerometers placed on left and right hips was excellent (ICC=0.96-0.99, CI<formula>_{95}</formula>: 0.81-0.99). Reproducibility of the protocol was good/excellent (ICC=0.75-0.95, CI<formula>_{95}</formula>: 0.75-0.98). Concurrent validity of accelerometer count data and VO2 was fair/good (rho=0.67, p< 0.001). The correlation between step count and VO2 was not significant (rho=0.29, p=0.2). CONCLUSION: This preliminary research suggests that ActiGraph GT3X accelerometers are reliable and valid devices to monitor PA during walking in children with CP and may be appropriate in rehabilitation research and clinical practice. ActiGraph GTX3 step counts were not valid for this sample and further research is warranted.

PMID: 25260506 [PubMed - in process]

10. NeuroRehabilitation. 2014 Sep 23. [Epub ahead of print]

Reproducibility of gait cycle and plantar pressure distribution in children with spastic hemiplegic cerebral palsy.

Leunkeu AN1, Lelard T1, Shephard RJ2, Doutrellot PL3, Ahmaidi S1.

BACKGROUND: Gait cycle and pressure distribution patterns can now be recorded quite simply and reproducibly with inexpensive in-sole pressure recorders. However, it is not known whether such readings are sufficiently stable to provide useful information in monitoring children with spastic hemiplegic cerebral palsy (HCP). OBJECTIVE: The aim of this study was to asses the reproducibility of gait cycle and plantar pressure in HCP. METHODS: Fourteen children with HCP (Gross Motor Function Classification System level I or II) undertook two walking trials (4 × 12 meters at self-selected speeds) with a one-week inter-test interval. Spatio-temporal gait cycle parameters and peak plantar pressures were measured at each visit, using Parotec in-shoe pressure sensors. RESULTS: In the unaffected limb, satisfactory reproducibility was found for measurements of velocity, step frequency, time of double support, and step duration, but not for step amplitude or contact time. However, in the affected limb, only velocity and step duration showed moderate reproducibility. Likewise, all of 8 pressure measurements were reproducible for the unaffected limb, but pressures for the affected limb were only consistent at 4 sites (metatarsals 4-5, lateral heel, lateral mid-foot and hallux). CONCLUSIONS: Since plantar pressures are unstable only in the affected limb, the cause of variation is likely immediate spasm during movement of this limb rather than a more permanent change of posture. Some spatio-temporal parameters and plantar pressure readings have sufficient stability in both unaffected and affected limbs to allow their use when evaluating gait and planning therapy for children with HCP.

PMID: 25248451 [PubMed - as supplied by publisher]

11. Res Dev Disabil. 2014 Sep 19;35(12):3624-3631. doi: 10.1016/j.ridd.2014.09.002. [Epub ahead of print]

Gait characteristics of children with cerebral palsy as they walk with body weight unloading on a treadmill and over the ground.

Celestino ML1, Gama GL1, Barela AM2.

Body weight support (BWS) has become a typical strategy for gait training, in special with children with cerebral palsy (CP). Although several findings have been reported in the literature, it remains uncertain how different types of surfaces and gradual amount of BWS can facilitate the mobility of children with CP. The aim of this study was to investigate gait kinematic parameters of children with CP by manipulating BWS and two different types of ground surfaces. Ten children (7.7±2.1 years old) diagnosed with spastic CP and GMFCS classification between levels II and IV were asked to walk on a treadmill and over the ground. In both conditions, BWS was manipulated to minimize gravitational effects and spatial-temporal gait parameters and lower limb joints were analyzed. The results revealed that the type of ground surface causes greater impact on the gait pattern of children with CP as compared to body weight unloading. This finding may provide new insights into the behavioral heterogeneity of children with CP, and offers critical information to be considered on interventional programs specifically designed to improve mobility on this population.

PMID: 25244695 [PubMed - as supplied by publisher]

12. Res Dev Disabil. 2014 Sep 17;35(12):3354-3364. doi: 10.1016/j.ridd.2014.07.053. [Epub ahead of print]

The relation between spasticity and muscle behavior during the swing phase of gait in children with cerebral palsy.

Bar-On L1, Molenaers G2, Aertbeliën E3, Monari D4, Feys H5, Desloovere K6.

There is much debate about how spasticity contributes to the movement abnormalities seen in children with spastic cerebral palsy (CP). This study explored the relation between stretch reflex characteristics in passive muscles and markers of spasticity during gait. Twenty-four children with CP underwent 3D gait analysis at three walking velocity conditions (self-selected, faster and fastest). The gastrocnemius (GAS) and medial hamstrings (MEHs) were assessed at rest using an instrumented spasticity assessment that determined the stretch-reflex threshold, expressed in terms of muscle lengthening velocity. Muscle activation was quantified with root mean square electromyography (RMS-EMG) during passive muscle stretch and during the muscle lengthening periods in the swing phase of gait. Parameters from passive stretch were compared to those from gait analysis. In about half the children, GAS peak muscle lengthening velocity during the swing phase of gait did not exceed its stretch reflex threshold. In contrast, in the MEHs the threshold was always exceeded. In the GAS, stretch reflex thresholds were positively correlated to peak muscle lengthening velocity during the swing phase of gait at the faster (r=0.46) and fastest (r=0.54) walking conditions. In the MEHs, a similar relation was found, but only at the faster walking condition (r=0.43). RMS-EMG during passive stretch showed moderate correlations to RMS-EMG during the swing phase of gait in the GAS (r=0.46-0.56) and good correlations in the MEHs (r=0.69-0.77) at all walking conditions. RMS-EMG during passive stretch showed no correlations to peak muscle lengthening velocity during gait. We conclude that a reduced stretch reflex threshold in the GAS and MEHs constrains peak muscle lengthening velocity during gait in children with CP. With increasing walking velocity, this constraint is more marked in the GAS, but not in the MEHs. Hyper-activation of stretch reflexes during passive stretch is related to muscle activation during the swing phase of gait, but has a limited contribution to reduced muscle lengthening velocity during swing. Larger studies are required to confirm these results, and to investigate the contribution of other impairments such as passive stiffness and weakness to reduced muscle lengthening velocity during the swing phase of gait.

PMID: 25240217 [PubMed - as supplied by publisher]

13. NeuroRehabilitation. 2014 Sep 23. [Epub ahead of print]

Effects of novel tubing gait on neuromuscular imbalance in cerebral palsy.

Shin YK1, Lee DR1, Kim DH1, Lee JJ1, You SJ1, Yi CH2, Jeon HS2.

BACKGROUND: Gait impairments from a neuromuscular imbalance are crucial issues in cerebral palsy. The purpose of our study was to compare the effects of the assistive tubing gait (ATG) and assistive-resistive tubing gait (ARTG) on improving the vasti and hamstring muscle imbalance during the initial contact to mid-stance phases in

individuals with spastic diplegic cerebral palsy (CP). METHODS: Fourteen age-matched individuals including seven normal individuals (11.7 years) and seven individuals with CP (12.9 years) were recruited. All participants underwent electromyography (EMG) measurement of the unilateral vasti and hamstring muscle activity during the three gait training conditions of no-tubing gait (NTG), ATG, and ARTG. A statistical one-way repeated-measure analysis of variance (ANOVA) was used to determine differences in the vasti and hamstring activity, the vasti/hamstring ratio, and the knee joint angle across the three gait training conditions for each group. RESULTS: The initial vasti and hamstring muscle imbalance in CP was significantly improved by applying the ARTG compared with the ATG. The vasti/hamstring ratio during the ARTG was compatible with the ratio value obtained from the NTG of normal individuals. The knee joint angle in CP was not improved in this short-term intervention. CONCLUSIONS: The ARTG proportionately increased the vasti activation and reciprocally inhibited the hamstring activity, subsequently improving the neuromuscular imbalance associated with the flexed-knee gait in individuals with spastic diplegic CP.

PMID: 25248450 [PubMed - as supplied by publisher]

14. Zhongguo Zhen Jiu. 2014 Jul;34(7):657-60.

Impacts on the lower limb motor function in children with spastic cerebral palsy treated by Jin three-needle therapy combined with MOTOmed intelligent motor training [Article in Chinese]

Zhang N, Tang QP, Xiong YH.

OBJECTIVE: To compare the differences in the efficacy on lower limb motor function in children with spastic cerebral palsy between the combined therapeutic program of Jin three-needle therapy and MOTOmed intelligent motor training and the simple MOTOmed. METHODS: Eighty children with spastic cerebral palsy were randomized into an observation group and a control group, 40 cases in each group. In the observation group, Jin three-needle therapy was used at four mind points, three brain points, three intelligent points, three temporal points, three knee points and three foot points, as well as Chengjin (BL 56), Chengshen (BL 57) and the other. Additionally, MOTOmed was given in assistance with conventional rehabilitation training. In the control group, MOTOmed and the conventional rehabilitation training were adopted. In the two groups, the treatment was given once a day, 20 treatments made one session and there were 3 to 5 days at interval between the two sessions. The efficacy evaluation was performed after continuous 3 sessions of treatment. The gross motor function measure (GMFM) and modified Ashworth scale (MAS) were applied for the evaluation before and after treatment in the two groups. RESULTS: After 3 sessions of treatment, GMFM score was increased apparently as compared with that before treatment in the two groups ($P < 0.01$, $P < 0.05$). After treatment, GMFM score in the observation group was increased more remarkably than that in the control group (55.32 +/- 17.10 vs 47.48 +/- 17.18, $P < 0.05$). After treatment, the total effective rate of gastrocnemius Ashworth spasm grade [90.0% (36/40)] in the observation group was better apparently than [72.5% (29/40)] in the control group ($P < 0.05$). CONCLUSION: The combined therapeutic program of Jin three-needle therapy and MOTOmet intelligent motor training improves the lower limb motor function of the children with spastic cerebral palsy and its efficacy is better than simple MOTOmed.

PMID: 25233652 [PubMed - in process]

15. Pediatr Phys Ther. 2014 Winter;26(4):436. doi: 10.1097/PEP.0000000000000079.

Commentary on "level versus inclined walking: ambulatory compensations in children with cerebral palsy under outdoor conditions".

Ordorica J.

PMID: 25251799 [PubMed - in process]

16. Pediatr Phys Ther. 2014 Winter;26(4):417. doi: 10.1097/PEP.0000000000000085.

Commentary on "the effect of torsional shoe flexibility on gait and stability in children learning to walk".

Sargent B1, Miller M.

PMID: 25251797 [PubMed - in process]

17. Disabil Health J. 2014 Aug 23. pii: S1936-6574(14)00108-3. doi: 10.1016/j.dhjo.2014.08.009. [Epub ahead of print]

Are physiotherapists reliable proxies for the recognition of pain in individuals with cerebral palsy? A cross sectional study.

Riquelme I1, Cifre I2, Montoya P2.

BACKGROUND: Pain is an important problem for individuals with cerebral palsy (CP). In addition to pain associated to the pathology, individuals with CP are often exposed to physiotherapy procedures which may cause or relieve pain. OBJECTIVE: The major aim of this study was to compare pain ratings self-reported by individuals with cerebral palsy and ratings about pain in others provided by their physiotherapists. METHOD: Cross-sectional study. Children and young adults with cerebral palsy (n = 50) and their physiotherapists (n = 18) completed semi-structured interviews about clinical pain, as well as about procedural pain and pain relief elicited by standardized health procedures. Moreover, pain ratings were obtained during the application of hamstring stretching and passive joint mobilization. RESULTS: Moderate-to-high agreement was observed between individuals with cerebral palsy and their physiotherapists on presence and intensity of pain, pain interference with physical activities and current and retrospective pain ratings elicited by physiotherapy procedures. By contrast, agreement regarding pain relief elicited by physiotherapy techniques was low. CONCLUSIONS: Our data suggest that although physiotherapists may be reliable proxies for the recognition of pain in individuals with cerebral palsy, further research should be done to improve the communication between health professionals and individuals with cerebral palsy around pain.

PMID: 25258089 [PubMed - as supplied by publisher]

18. Endoscopy. 2014 0;46(S 01):E375-E376. Epub 2014 Sep 25.

Successful treatment of acute gastric volvulus by emergency endoscopic reduction in a patient with cerebral palsy.

Kılınçalp S, Akinci H, Coban S.

PMID: 25254583 [PubMed - as supplied by publisher]

19. Int J Pediatr Otorhinolaryngol. 2014 Sep 6. pii: S0165-5876(14)00485-6. doi: 10.1016/j.ijporl.2014.08.041. [Epub ahead of print]

Botulinum toxin A for children with salivary control problems.

Montgomery J1, McCusker S2, Hendry J2, Lumley E2, Kubba H2.

OBJECTIVE: The aim of this study was to review the response of children who have received botulinum toxin A (BtA) injections for saliva control in our institution. METHODS: Retrospective case series of children attending a saliva control clinic in a paediatric tertiary referral hospital. Children were identified from the saliva control database, which has been in place since its creation in 2006. Prior to receiving BtA all the children in the study had previously undertaken a 3-month trial of pharmacological therapy, with no effect. All BtA injections were performed freehand to the parotid and submandibular glands. The background diagnosis, comorbidities for the child, age at presentation, dose of BtA, the response, and any complications were recorded. RESULTS: 97 children were identified and 175 BtA doses were given (median per child: 1, mean: 1.9). 59 (61%) were male. The age range was between 2 months and 18 years (mean 8.6 years, median 8.8 years). The dose injected varied between 0.52 units/kg and 21.28 unit/kg (mean 5 units/kg, median 4.2 units/kg). These were performed using local anaesthetic on 131 (75%) occasions. The remainder were performed under general anaesthetic. Responses to BtA were classed as effective 109 (62%),

partially effective 14 (8%) or not effective 50 (29%). The response duration was between 0.25 and 18 months (mean 4 months). Complications were seen following 22 injections (10.9%). Data modelled using binary logistic regression found that male gender and children with cerebral palsy are statistically predicted to have a better response to BtA. CONCLUSION: Botulinum A injected under local anaesthetic is a safe, effective treatment for children with sialorrhoea. Ultrasound guidance is not necessary as long as anatomical landmarks are used for placement. The main adverse effect that can result is dysphagia, which is of concern in children that can swallow independently prior to injection. Male sex and cerebral palsy are statistically independent positive predictive factors for successful outcome of BtA injections for sialorrhoea, however this does not preclude other children from receiving or benefitting from it. Children that respond well to BtA initially, are likely to respond well in the future.

PMID: 25242701 [PubMed - as supplied by publisher]

20. Pain Med. 2014 Sep 19. doi: 10.1111/pme.12545. [Epub ahead of print]

Can Biomarkers Differentiate Pain and No Pain Subgroups of Nonverbal Children with Cerebral Palsy? A Preliminary Investigation Based on Noninvasive Saliva Sampling.

Symons FJ1, ElGhazi I, Reilly BG, Barney CC, Hanson L, Panoskaltsis-Mortari A, Armitage IM, Wilcox GL.

OBJECTIVE: Assessing and treating pain in nonverbal children with developmental disabilities are a clinical challenge. Current assessment approaches rely on clinical impression and behavioral rating scales completed by proxy report. Given the growing health relevance of the salivary metabolome, we undertook a translational-oriented feasibility study using proton nuclear magnetic resonance (NMR) spectroscopy and neuropeptide/cytokine/hormone detection to compare a set of salivary biomarkers relevant to nociception. DESIGN: Within-group observational design. SETTING: Tertiary pediatric rehabilitation hospital. SUBJECTS: Ten nonverbal pediatric patients with cerebral palsy with and without pain. METHODS: Unstimulated (passively collected) saliva was collected using oral swabs followed by perchloric acid extraction and analyzed on a Bruker Avance 700 MHz NMR spectrometer. We also measured salivary levels of several cytokines, chemokines, hormones, and neuropeptides. RESULTS: Partial least squares discriminant analysis showed separation of those children with/without pain for a number of different biomarkers. The majority of the salivary metabolite, neuropeptide, cytokine, and hormone levels were higher in children with pain vs no pain. CONCLUSIONS: The ease of collection and noninvasive manner in which the samples were collected and analyzed support the possibility of the regular predictive use of this novel biomarker-monitoring method in clinical practice.

PMID: 25234580 [PubMed - as supplied by publisher]

21. Child Care Health Dev. 2014 Sep;40(5):680-8.

Use of the Measure of Processes of Care (MPOC-20) to evaluate health service delivery for children with cerebral palsy and their families in Jordan: validation of Arabic-translated version (AR-MPOC-20).

Saleh M, Almasri NA.

BACKGROUND: Family-centred service (FCS) is widely accepted now as best practice in paediatric rehabilitation. The Measure of Processes of Care-20 items set (MPOC-20) is a valid and reliable self-report measure of parents' perceptions of the extent to which health services are family-centred. Arabic-translated and validated version of the MPOC-20 (AR-MPOC-20) is used to examine Jordanian families' perception of service providers' caregiving behaviours as they receive rehabilitation services for their children with cerebral palsy (CP). METHODS: Parents of 114 children with CP who are receiving services at different settings in Jordan were interviewed using the AR-MPOC-20. Participating children aged 4.1 ± 4.4 years, 53.5% were males. Children varied across gross motor functional classification system (GMFCS). Parents were mostly mothers (76.3%), with at least high school education (71.9%). RESULTS: Factor analyses of the AR-MPOC-20 yielded a five-factor solution with items loaded differently from the original measure. All items correlated best and significantly with their own Arabic scale score (rs: 0.91-0.26, $P < 0.01$). Internal consistency values of AR-MPOC-20 scales were acceptable (Cronbach's α: 0.69-

0.82). Scale 'Providing Written Information' has the lowest average score (1.9 ± 1.6), while scale 'Respectful & Coordinated Care' has the highest average score (5.2 ± 1.5). CONCLUSION: The AR-MPOC-20 is found to be a valid and reliable measure for use with Arabic-Jordanian families of children with CP. FCS is not yet well implemented in Jordan, with parents reporting more need for information about their children's health and available services. Service providers are encouraged to apply FCS in paediatric rehabilitation, and giving more attention to effective communication and information exchange with families. AR-MPOC-20 is recommended for use for program evaluation.

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22. Med J Islam Repub Iran. 2014 Feb 26;28:16. eCollection 2014.

Rehabilitation Needs of People with Cerebral Palsy: a qualitative Study.

Sharifi A1, Kamali M2, Chabok A3.

BACKGROUND: Cerebral palsy (CP) describes a group of disorders regarding the development of movement and posture, which causes limitations in activity. In fact, it is attributed to non-progressive disturbances that occur during brain development in fetus or infant. CP disorders may accompany by speech, auditory, visual abnormality, seizure, learning disorder, mental retardation and etc. Due to the variation in disorders and ultimately the needs that are made in the wake of the diseases, understanding the needs of these patients is essential. METHODS: This research was a qualitative study, with phenomenology method and sampling was purposeful. The participants were 17 cerebral palsy people (6 female and 11 male, with aged 15 to 43). Data were collected by deep interview with open-end questions and analyzed by collaizi method. RESULTS: During the interview sessions, notes and ideas were classified and assorted, so that, the rehabilitation needs of people with CP were understood according to the statements of participants. The results of this study were placed in four domains, 3 themes and 22 subthemes. The domains included social, emotional needs, economic, and therapeutic needs. CONCLUSION: The requirements studies in this research were particularly introduced by patients with CP. People in the society, who might have contact with these patients, are responsible to help them to overcome their problems and disabilities.

PMID: 25250261 [PubMed] PMCID: PMC4154271 Free PMC Article

23. BMJ. 2014 Sep 25;349:g5474. doi: 10.1136/bmj.g5474.

Managing common symptoms of cerebral palsy in children.

Sewell MD1, Eastwood DM1, Wimalasundera N2.

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24. Front Psychol. 2014 Sep 8;5:992. doi: 10.3389/fpsyg.2014.00992. eCollection 2014.

Investigating executive functions in children with severe speech and movement disorders using structured tasks.

Stadskleiv K1, von Tetzchner S2, Batorowicz B3, van Balkom H4, Dahlgren-Sandberg A5, Renner G6.

Executive functions are the basis for goal-directed activity and include planning, monitoring, and inhibition, and language seems to play a role in the development of these functions. There is a tradition of studying executive function in both typical and atypical populations, and the present study investigates executive functions in children with severe speech and motor impairments who are communicating using communication aids with graphic symbols, letters, and/or words. There are few neuropsychological studies of children in this group and little is known about their cognitive functioning, including executive functions. It was hypothesized that aided communication would tax executive functions more than speech. Twenty-nine children using communication aids and 27 naturally speaking children participated. Structured tasks resembling everyday activities, where the action goals had to be reached through communication with a partner, were used to get information about executive functions. The children (a) directed the partner to perform actions like building a Lego tower from a model the partner could not

see and (b) gave information about an object without naming it to a person who had to guess what object it was. The executive functions of planning, monitoring, and impulse control were coded from the children's on-task behavior. Both groups solved most of the tasks correctly, indicating that aided communicators are able to use language to direct another person to do a complex set of actions. Planning and lack of impulsivity was positively related to task success in both groups. The aided group completed significantly fewer tasks, spent longer time and showed more variation in performance than the comparison group. The aided communicators scored lower on planning and showed more impulsivity than the comparison group, while both groups showed an equal degree of monitoring of the work progress. The results are consistent with the hypothesis that aided language tax executive functions more than speech. The results may also indicate that aided communicators have less experience with these kinds of play activities. The findings broaden the perspective on executive functions and have implications for interventions for motor-impaired children developing aided communication.

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25. Child Care Health Dev. 2014 Sep 24. doi: 10.1111/cch.12196. [Epub ahead of print]

A retrospective study of past graduates of a residential life skills program for youth with physical disabilities.

Kingsnorth S1, King G, McPherson A, Jones-Galley K.

BACKGROUND: Young people with physical disabilities experience issues regarding employment, schooling, independent living and establishing meaningful personal relationships. A lack of life skills has been recognized as an important factor contributing to this lag. The Independence Program (TIP) is a short-term residential life skills program that aims to equip youth with the foundational life skills required to assume adult roles. This study retrospectively examined the achievements, skills acquired and program attributions of youth and young adults who took part in this three-week immersive teen independence program over a 20-year period. METHODS: A total of 162 past graduates were invited to take part, with 78 doing so (a 48% response rate). These past graduates completed an online survey assessing objective outcomes such as employment and independent living; subjective outcomes such as feeling in control and living meaningful lives; and reflections on skills acquired, opportunities experienced and attributions to TIP. RESULTS: The majority of respondents were female (71%), had a diagnosis of cerebral palsy (55%) and ranged from 20 to 35 years of age (92%). Despite a range of outcomes related to the achievement of adult roles, high levels of life satisfaction and overall quality of life were reported. Nearly every respondent reported using the skills they learned at the program in their lives afterwards and a high percentage attributed the acquisition and consolidation of core life skills to participating in this intensive immersive program. CONCLUSIONS: Although causality cannot be assumed, respondents reflected very positively on the opportunities provided by TIP to develop their independent living and life skills, extend their social networks and understand their strengths and weaknesses. Such findings validate the importance of targeted skill development to assist young people with physical disabilities in attaining their life goals and encourage focused investigations of key features in program design.

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Prevention and Cure

26. Am J Perinatol. 2014 Sep 21. [Epub ahead of print]

Effect of Magnesium Sulfate Administration for Neuroprotection on Latency in Women with Preterm Premature Rupture of Membranes.

Horton AL1, Lai Y2, Rouse DJ3, Spong CY4, Leveno KJ5, Varner MW6, Mercer BM7, Iams JD8, Wapner RJ9, Sorokin Y10, Thorp JM11, Ramin SM12, Malone FD13, O'Sullivan MJ14, Hankins GD15, Caritis SN16; for the Eunice Kennedy Shriver National Institute of Child Health and Human Development Maternal-Fetal Medicine Units Network.

Objective: This study aims to evaluate whether magnesium sulfate administration for neuroprotection prolongs latency in women with preterm premature rupture of membranes (PPROM) between 24 and 316/7 weeks' gestation. Study Design: This is a secondary analysis of a randomized controlled trial of magnesium sulfate for prevention of cerebral palsy. Gravid women with a singleton pregnancy between 24 and 316/7 weeks' gestation with PPROM without evidence of labor were randomized to receive magnesium sulfate, administered intravenously as a 6-g bolus followed by a constant infusion of 2 g per hour up to 12 hours, or placebo. Maternal outcomes for this analysis were delivery in less than 48 hours and in less than 7 days from randomization. Neonatal outcomes included a composite of respiratory distress syndrome, interventricular hemorrhage grades 3 or 4, periventricular leukomalacia, sepsis, necrotizing enterocolitis, retinopathy of prematurity, or death. Results: A total of 1,259 women were included. The rate of delivery < 48 hours was not different in the magnesium sulfate and the placebo groups (22.2 and 20.7%, p = 0.51). Delivery < 7 days was similar between groups (55.4 and 51.4%, p = 0.16). Median latency was also similar between groups (median [interquartile range], 6.0 days [range, 2.4-13.8 days] and 6.6 days [range, 2.4-15.1 days], p = 0.29). Composite neonatal outcomes did not differ between groups. Conclusion: Magnesium sulfate administration given for neuroprotection in women with a singleton gestation with PPROM and without labor before 32 weeks does not impact latency.

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27. J Pediatr Rehabil Med. 2014 Jan 1;7(3):219-32. doi: 10.3233/PRM-140291.

Identifying premature infants at high and low risk for motor delays using motor performance testing and MRS.

Coker-Bolt P1, Woodbury ML2, Perkel J3, Moreau NG4, Hope K3, Brown T5, Ramakrishnan V6, Mulvihill D5, Jenkins D3.

PURPOSE: To determine specific motor skills in premature infants, match those that correlate with standards tests of motor performance, and MRS measures of abnormal brain biochemistry. METHODS: Prospective cohort study of preterm infants (n=22). Infant motor assessments were completed at term and 12 weeks corrected gestational age (CGA) using the Test of Infant Motor Performance (TIMP) and Bayley Scales of Infant and Toddler Development-III at 12 months CGA. Infants (n=12) received MRS scans at term CGA. Rasch analysis and MRS findings investigated TIMP items well targeted to high and low risk infants. RESULTS: A 10 item subset of motor skill items correlated strongly with full 42-item TIMP at term and 12 week testing (r> 0.90, p< 0.001 for both), and with Bayley gross motor scores. MRS metabolites in basal ganglia correlated significantly with both TIMP and 10 item motor tests at term, while frontal white matter metabolites correlated with TIMP and 10 item tests at 12 weeks and Bayley motor scores. CONCLUSION: A short motor skill assessment may be representative of a longer standardized test and relate to brain metabolic function in key areas for motor movement and development. Validation of a shortened assessment may improve early identification of high-risk preterm infants.

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28. JIMD Rep. 2014 Sep 21. [Epub ahead of print]

m.8993T>G-Associated Leigh Syndrome with Hypocitrullinemia on Newborn Screening.

Mori M1, Mytinger JR, Martin LC, Bartholomew D, Hickey S.

Citrulline is among the metabolites measured by expanded newborn screening (NBS). While hypocitrullinemia can be a marker for deficiency of proximal urea cycle enzymes such as ornithine transcarbamylase (OTC), only a handful of state newborn screening programs in the United States officially report a low citrulline value for further work-up due to low positive predictive value. We report a case of a male infant who was found to have hypocitrullinemia on NBS. After excluding proximal urea cycle disorders by DNA sequencing, his NBS result was felt to be a false positive. At 4 months of age, he developed poor feeding, failure to thrive, apnea and infantile spasms with a progression to intractable seizures, as well as persistent hypocitrullinemia. He was diagnosed with Leigh syndrome due to a maternally inherited homoplasmic m.8993T>G mutation in the ATPase 6 gene. His mother, who had previously been diagnosed with cerebral palsy, was concurrently diagnosed with neuropathy, ataxia, and retinitis pigmentosa (NARP) due to heteroplasmy of the same mutation. She had progressive muscle weakness, ataxia, and speech dyspraxia. The m.8993T>G mutation causes mitochondrial ATP synthase deficiency and it is hypothesized to undermine the synthesis of citrulline by CPS1. In addition to proximal urea cycle disorders, the evaluation of an infant with persistent hypocitrullinemia should include testing for the m.8993T>G mutation and other disorders that cause mitochondrial dysfunction.

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29. Orphanet J Rare Dis. 2014 Apr 17;9:57. doi: 10.1186/1750-1172-9-57.

Phenotype and frequency of STUB1 mutations: next-generation screenings in Caucasian ataxia and spastic paraplegia cohorts.

Synofzik M1, Schüle R, Schulze M, Gburek-Augustat J, Schweizer R, Schirmacher A, Krägeloh-Mann I, Gonzalez M, Young P, Züchner S, Schöls L, Bauer P.

BACKGROUND: Mutations in the gene STUB1, encoding the protein CHIP (C-terminus of HSC70-interacting protein), have recently been suggested as a cause of recessive ataxia based on the findings in few Chinese families. Here we aimed to investigate the phenotypic and genotypic spectrum of STUB1 mutations, and to assess their frequency in different Caucasian disease cohorts. METHODS: 300 subjects with degenerative ataxia (n = 167) or spastic paraplegia (n = 133) were screened for STUB1 variants by whole-exome-sequencing (n = 204) or shotgun-fragment-library-sequencing (n = 96). To control for the specificity of STUB1 variants, we screened an additional 1707 exomes from 891 index families with other neurological diseases. RESULTS: We identified 3 ataxia patients (3/167 = 1.8%) with 4 novel missense mutations in STUB1, including 3 mutations in its tetratricopeptide-repeat domain. All patients showed evidence of pyramidal tract damage. Cognitive impairment was present only in one and hypogonadism in none of them. Ataxia did not start before age 48 years in one subject. No recessive STUB1 variants were identified in families with other neurological diseases, demonstrating that STUB1 variants are not simply rare polymorphisms ubiquitous in neurodegenerative disease. CONCLUSIONS: STUB1-disease occurs also in Caucasian ataxia populations (1.8%). Our results expand the genotypic spectrum of STUB1-disease, showing that pathogenic mutations affect also the tetratricopeptide-repeat domain, thus providing clinical evidence for the functional importance of this domain. Moreover, they further delineate the phenotypic core features of STUB1-ataxia. Pyramidal tract damage is a common accompanying feature and can include lower limb spasticity, thus adding STUB1-ataxia to the differential diagnosis of "spastic ataxias". However, STUB1 is rare in subjects with predominant spastic paraplegia (0/133). In contrast to previous reports, STUB1-ataxia can start even above age 40 years, and neither hypogonadism nor prominent cognitive impairment are obligatory features.

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