1. Constraint Induced Movement Therapy: Impact of Setting on Outcomes.
Maring J, Wentzell E.


AIMS: Constraint induced movement therapy improves upper extremity (UE) function in children with unilateral cerebral palsy (CP). Impact of intervention setting is unknown. The current investigation aimed to determine impact of therapy setting on UE function in children with unilateral CP. METHODS: Children were assigned to either center-based (CB) or home-based (HB) interventions using a single-blind cross-over design. RESULTS: UE function improved significantly in all children; greater improvements were found in the CB group. After the HB group received 10 additional weeks of CB intervention, between-group scores were not different but within-group changes were also not significant. CONCLUSIONS: Dose may be more important than setting but CB may be more effective than HB in the short term.

PMID: 31487365

Bouvier B, Gaillard F, Bouzillé G, Pasquet T, Rauscent H, Bonan I, Crétual A.


INTRODUCTION: Quantitative evaluation of upper limb (UL) kinematics in children with unilateral cerebral palsy (uCP) remains challenging for researchers and clinicians, especially during bimanual situations. This study proposed a new 3D bimanual protocol dedicated to children with uCP, called "Be an Airplane Pilot" (BE-API protocol) and assessed its reliability for typically developing children (TDC). METHODS: this protocol is composed of four bimanual tasks that allow the exploration of all degrees of freedom of the hemiplegic/non-dominant UL. Twenty TDC (mean age 11.9 ± 3.4) carried out three protocol sessions. Reliability was investigated through three kinematic parameters: angular waveforms (WAVE) using the coefficient of multiple correlation (CMC), range of motion (RoM) and maximum angles (MAX) both using the intra-class correlation coefficient (ICC) and the standard error of measurement (SEM). RESULTS: A very good reliability was observed for the three kinematic parameters in most cases (WAVE: CMC ≥0.90, RoM & MAX: ICC ≥0.81, SEM ≤5.0°). DISCUSSION: the very good reliability can be partly explained by the high level of rigor of the protocol. Such promising results open the door to validation tests on children with uCP. The BE-API protocol could pretend to support clinical decisions by objectively assessing the efficiency of therapeutics, e.g. injection of botulinic toxin.

PMID: 31479929
3. Health related quality of life and manual ability 5 years after neonatal ischemic stroke.
Caspar-Teuscher M, Studer M, Regényi M, Steinlin M, Grunt S; Swiss Neuropediatric Stroke Registry Group.


AIM: To investigate health-related quality of life (HRQOL) and manual ability five years after neonatal arterial ischemic stroke (NAIS). METHODS: Data was prospectively obtained by the Swiss Neuropediatric Stroke Registry between 2000 and 2010. Two years after NAIS, cognitive and motor outcomes was assessed using the Bayley Scales of Infant Development (BSID-II). After 5 years, HRQOL was assessed with the KIDSSCREEN-27 and manual ability with the ABILHAND-Kids. Manual ability and HRQOL were compared between children with and without cerebral palsy (CP) and HRQOL was correlated with manual ability. RESULTS: Seventy-four patients were examined at the age of 2 years, at the age of 5 years 61 patients underwent a follow-up examination. Two years after NAIS, 29 children (39.1%) were diagnosed with CP. HRQOL 5 years after NAIS was comparable to normative values. Children with CP had a significantly lower HRQOL-index (p = 0.013) and lower scores in the subscale psychological well-being (p = 0.012) and social support & peers (p = 0.048). The ABILHAND-Kids measure was significantly lower in children with CP compared to children without CP (p < 0.001). Manual ability correlated significantly with HRQOL. CONCLUSION: Five years after NAIS, HRQOL is comparable to that of typically developing peers, but reduced in children with CP. Poorer manual ability is associated with lower HRQOL. Interventions improving hand function might influence HRQOL and should be considered early on.

PMID: 31473077

Cotrill EJ, Johnson DC, Silberstein CE.


PURPOSE: To identify factors associated with success of corrective bony hip surgery among patients with cerebral palsy (CP). METHODS: A retrospective review was conducted of medical records of patients diagnosed with CP and hip displacement who underwent surgery from 2004 to 2016 at the authors' institution and who had one-year minimum follow-up. Patient age, sex, Gross Motor Function Classification System (GMFCS) level, surgical procedure(s), type and extent of CP, presence of preoperative and postoperative hip pain, and hip migration percentages (MPs) were recorded. Surgical success was defined as a postoperative MP ≤ 30% and no hip pain at final follow-up. RESULTS: Thirty-eight patients (55 hips) met the inclusion criteria. Mean age at surgery was 10.2 years (range, 2-24 years). Mean MP (standard deviation) improved from 64 ± 29% preoperatively to 22 ± 30% at mean 1.7-year follow-up (p< 0.001). The absence of preoperative hip pain (p= 0.014), surgery after age 5 (p= 0.041), and a milder preoperative MP (p< 0.001) were significantly associated with surgical success. CONCLUSION: In patients with CP and hip displacement, early preventative correction of hip displacement after age 5 may improve clinical outcomes, though future studies are needed to provide more definitive clinical direction.

PMID: 31476176

Ali MS, Awad AS, Elssal MI.


OBJECTIVES: Postural control involves controlling the position of the body in space to achieve stability and orientation. Core stability is needed to improve balance and postural control. Whole-body vibration is a unique strategy for muscle strengthening in various clinical situations. This study compared the effects of whole-body vibration and a core stability program on balance in children with spastic cerebral palsy, with an intervention period of 12 weeks. METHODS: A total of 72 children with spastic cerebral palsy (hemiplegic and diplegic), of both sexes (age, 5-8 years), were selected from the outpatient clinic of the Faculty of Physical Therapy, Cairo University. The children were randomly assigned to 2 groups. Group A underwent a core stability program for 30 min and group B underwent whole-body vibration training for 10 min, at 3 times a week for 12 weeks for both groups. Balance was assessed using the Biodex Balance System. RESULTS: A significant improvement in all variables (p < 0.05) was observed in each group, with greater improvement of all stability indices (anteroposterior, mediolateral, and overall) in group B. There were non-significant differences in all stability indices between hemiplegic and diplegic children (p > 0.05). CONCLUSION: Whole-body vibration and core stability exercises are recommended for the treatment of children with spastic...
cerebral palsy. Whole-body vibration was more effective than the core stability program in improving balance in children with spastic cerebral palsy.

PMID: 31488967

Wood WH, Fields BE.

Purpose: Comprehensively and systematically map peer-reviewed studies of hippotherapy published over 30 years, from 1980 through 2018, from the perspective of a phased scientific approach to developing complex interventions as a guide to future research and practice.

Methods: A systematic mapping review of research of hippotherapy was conducted. Searches of nine databases produced 3,528 unique records; 78 full-text, English-written studies were reviewed, the earliest of which was published in 1998. Data relevant to study aims were extracted electronically from these studies and analyzed using queries and pivot tables.

Results: Children with cerebral palsy and physical therapists were most prevalent as participants and providers. Equine movement was hippotherapy's core component and mechanism. Early-phase outcomes-oriented research predominated. "Hippotherapy" was ambiguously defined as treatment strategies and comprehensive professional services, even as interventions grew more distinctive and complex. A treatment theory and proof of concept related to motor outcomes were established, and efficacy research with comparison conditions emerged.

Conclusions: Continuing research of complex interventions that integrate hippotherapy, equine movement as a therapy tool, is warranted. Attention to gaps in foundational scientific work concurrent with continued piloting and efficacy work will help to identify the most promising interventions worthy of replication, evaluation and widespread adoption.

IMPLICATIONS FOR REHABILITATION To advance the evidence base of complex interventions that incorporate hippotherapy:
• Proponents of hippotherapy need to define and represent hippotherapy to the public and in practice and research contexts as a therapy tool involving the use of the movement of horses by qualified professionals, rather than simply as a generic therapy with the help of a horse or simulated horse;
• Providers of hippotherapy need to identify their professional degrees and certifications, and explicate their disciplinary perspectives that influence their selected components of intervention, related methods, and outcomes; and
• Providers and researchers need to partner to develop an enablement theory of hippotherapy that links improved body functions with improved participation in everyday life and quality of life.

PMID: 31491353

7. Distal Femoral Shortening Osteotomy for Severe Knee Flexion Contracture and Crouch Gait in Cerebral Palsy.
Park H, Park BK, Park KB, Abdel-Baki SW, Rhee I, Kim CW, Kim HW.


Although there have been advancements of surgical techniques to correct gait abnormalities seen in patients with cerebral palsy, the crouch gait remains one of the most difficult problems to treat. The purpose of this retrospective study was to examine our results of distal femoral shortening osteotomy (DFSO) and patellar tendon advancement (PTA), performed in patients with crouch gait associated with severe knee flexion contracture. A total of 33 patients with a mean fixed knee contracture of 38° were included in the study. The mean age at the time of surgery was 12.2 years and the mean follow-up was 26.9 months. The measurements of clinical, radiological, and gait parameters were performed before and after surgery. The mean degrees of knee flexion contracture, Koshino index of patella height, and Gait Deviation Index were found to be significantly improved at the time of final follow-up. The maximum knee extension during the stance phase improved by an average of 25°, and the range of knee motion during gait increased postoperatively. On the other hand, the mean anterior pelvic tilt increased by 9.9°. Also, the maximum knee flexion during the swing phase decreased and the timing of peak knee flexion was observed to be delayed. We conclude that combined procedure of DFSO and PTA is an effective and safe surgical method for treating severe knee flexion contracture and crouch gait. However, the surgeons should be aware of the development of increased anterior pelvic tilt and stiff knee gait after the index operation.

PMID: 31480593

Boulard C, Gautheron V, Lapole T.
Children with cerebral palsy (CP) present increased passive ankle joint stiffness, measured as the slope of the torque-angle curve relationship. However, large discrepancies in results exist among studies, likely because of various methodologies used. The purpose of this study was to determine the influence of different calculation methods on the outcomes and their inter-session reliability in children with unilateral CP (UCP). Thirteen children (mean age: 9.8 years) with spastic UCP underwent passive ankle mobilization at 2°/s on both legs using a dynamometer, on two occasions separated by one week. Passive ankle joint stiffness was calculated as the slope of the torque-angle curve using linear regression on three different relative ranges of torque (i.e. 30%-100%, 20-80% and 50-90% of maximal torque for method 1, 2 and 3, respectively) for both the paretic and non-paretic legs. Inter-session reliability was significantly lower on paretic leg (mean CV = 13.8%, ICC = 0.62) when compared to non-paretic leg (mean CV = 6%, ICC = 0.85), and method 3 presented lower reliability outcomes (mean CV = 11.7%, ICC = 0.75) than methods 1 (mean CV = 7.5%, ICC = 0.78) and 2 (mean CV = 6.6%, ICC = 0.79). Paretic values (0.24 Nm°) were not different from the non-paretic leg (0.25 Nm°), although significantly higher when considering the same angular sector (0.18 Nm°). Passive ankle joint stiffness measurement can be reliably performed in children with UCP using method 1 and 2 while method 3 should be avoided. The non-paretic leg may be used for comparison with the paretic leg when taking into account differences in maximal dorsiflexion angle between legs. ClinicalTrials.gov Identifier: NCT02960932.

PMID: 31473451

9. Radiological outcome after treatment of juvenile flatfeet with subtalar arthroereisis: a matched pair analysis of 38 cases comparing neurogenic and non-neurogenic patients.


PURPOSE: Therapy of juvenile neurogenic flatfoot (JNF) with subtalar arthroereisis (SA) is currently under critical clinical investigation. In this retrospective matched pair analysis, the radiological outcome after arthroereisis in paediatric patients with infantile cerebral palsy and JNF was compared with children with juvenile flatfeet (JF) without neurological diseases.

METHODS: From October 2007 to April 2018 80 patients with 149 flatfeet underwent surgery with SA. Inclusion criteria were: 1) JNF or JF with age at surgery ≤ 13 years; 2) treatment with SA; 3) presence of three sets of biplane radiographs (preoperative, postoperative and follow-up (FU)). The radiographs were analyzed for: 1) navicular-cuboidal-index (NCI); 2) talocalcaneal angle anteroposterior; 3) talocalcaneal angle lateral; 4) calcaneal-pitch (CP); and 5) talometatarsal-index (TMTI). Following this, 25 patients with 38 flatfeet could be included. RESULTS: The mean age at SA of the JNF group was 9.2 years (JF group: 9.3 years) and the mean time of FU was 35.2 months (JF group: 39.4 months). In comparison with preoperatively, a significant decrease of the NCI was seen in both groups (p ≤ 0.05 and p ≤ 0.001) in the FU radiographs. The analysis of CP and TMTI in the JF group also resulted in a significant improvement (p ≤ 0.001 and p ≤ 0.05). Overall, the comparison between the JNF and JF group showed no significant differences in regard to the analyzed postoperative parameters.
CONCLUSION: Based on this data, treatment of flatfeet by SA in patient with neurological disorders shows an improvement of radiological parameters comparable with neurologically unimpaired patients and might be considered as additional treatment option. LEVEL OF EVIDENCE: IV.

PMID: 31489039

10. Association of back pain and pelvic tilt during gait in individuals with cerebral palsy.
Novaczyk ZB, Georgiadis AG, Boyer ER.


BACKGROUND: Back pain prevalence may increase with lumbar lordosis during standing in individuals with cerebral palsy (CP). Multiple interventions undertaken in individuals with CP have been shown to increase anterior pelvic tilt. RESEARCH QUESTION: Are pelvic tilt and trunk tilt (proxy measurements for lumbar lordosis) during gait associated with back pain prevalence in ambulatory individuals with CP? METHODS: A retrospective investigation was performed among all patients with cerebral palsy visiting a single clinical motion analysis laboratory over a 3.5 year period (January 2015 - May 2018) who also had complete pain questionnaire data. Back pain prevalence and its association with sagittal plane kinematic parameters (pelvic tilt and trunk tilt) were analyzed. RESULTS: Among the 700 patients that met the inclusion criteria, 594 were children and 106 were adults. Back pain prevalence was 11.1% in children and 36.8% in adults. As pelvic tilt and age increased, back pain increased (odds ratio 95% confidence interval: 1.002-1.061 and 1.052-1.109, respectively). Walking with an assistive device was not associated with back pain, nor was trunk tilt. SIGNIFICANCE: Back pain was more common with increasing
age in ambulatory individuals with CP. After controlling for assistive device use and age, there was a weak relationship between pelvic tilt and back pain. Future studies are needed to determine if this is a causal relationship.

PMID: 31472331

11. Gait Pattern of Adults with Cerebral Palsy and Spastic Diplegia More Than 15 Years after Being Treated with an Interval Surgery Approach: Implications for Low-Resource Settings.
Langerak NG, Tam N, du Toit J, Fieggen AG, Lamberts RP.


BACKGROUND: Single-event multilevel surgery (SEMLS) approach is regarded as the golden standard in developed countries to improve gait and functional mobility in children with cerebral palsy (CP). However, this approach is not always feasible in developing countries. Therefore, orthopedic surgery based on an interval surgery approach (ISA) is still commonly used in developing countries, although little is known about the long term outcomes of an ISA. Therefore, the aim of this study was to describe the gait patterns of adults with CP, who have been treated with ISA, which started more than 15 years ago.

MATERIALS AND METHODS: Thirty adults with CP and spastic diplegia, who received ISA treatment 21.6-33.7 years ago, were recruited for this study and participated in three-dimensional gait analysis. Twenty kinematic and nondimensional temporal-distance parameters were captured, while the overall gait deviation index (GDI) was also calculated. Data of the adults with CP were compared to normative data of typically developing (TD) adults. RESULTS: Although all adults with CP were still ambulant, their gait parameters significantly differed from TD adults, with a lower GDI in the adults with CP. The CP gait patterns were characterized by excessive hip flexion and hip internal rotation as well as a stiff-knee gait. CONCLUSION: Although different to TD adults, the gait patterns observed in the adult with CP treated with ISA is in line with other studies. Gait patterns suggest that derotation osteotomies potentially could have improved the long term gait patterns. Although SEMLS might be the preferred treatment method, potentially resulting in better outcomes, ISA can also be used to treat children with CP in developing countries as India and South Africa, where a SEMLS approach is not always feasible.

PMID: 31488936

Hareb F, Bertoncelli CM, Rosello O, Rampal V, Solla F.


Injected in a muscle, the botulinum toxin causes localized and temporary paralysis by acting on the neuromuscular synapse. Currently, it is widely prescribed for the treatment of limb spasticity in children from the age of 2 years. Combined with rehabilitation and other treatments, it helps to progress in motor learning, promotes functional progression, and delays orthopaedic degradations. Numerous randomized, placebo-controlled studies have shown efficacy in reducing spasticity, improving passive and active mobility, reducing pain, and improving upper limb comfort care. The side effects are rare and commonplace. The injection technique is accessible after specific training and practice. The indication is better evaluated by a multidisciplinary team. A precise clinical evaluation, assisted by an instrumental analysis (videography, spatiotemporal parameters, kinematics, kinetics, and electromyography), makes it possible to determine the aims of the treatment and to evaluate the outcome. The objective of this review is to present current evidence base and practices regarding the use of botulinum toxin in children with cerebral palsy.

PMID: 31486052

Mahmood Q, Habibullah S, Babur MN.


OBJECTIVE: To evaluate the effects of traditional massage (TM) on spasticity and gross motor function in children with cerebral palsy (CP). METHODS: This randomized control trial (RCT) was conducted with recruitment of 86 children (Dropped
out = 11; Analyzed = 75) with spastic CP (diplegia) allocated randomly through sealed envelope method to intervention and control group with ages between 2-10 years from September 2016 to August 2018. Both groups received conventional physical therapy (CPT) once daily, five times a week for a period of three months. However, intervention group received TM additionally. Modified Ashworth Scale (MAS), Gross Motor Function Measure (GMFM-88) and Gross Motor Function Classification System (GMFCS) were used to evaluate spasticity and gross motor function at the beginning, after six and 12 weeks of intervention. Data were compared and analyzed through SPSS-20. RESULTS: Mean age in control and intervention group was 6.81±2.31 and 7.05±2.47 years respectively. No statistically significant differences in MAS, GMFM and GMFCS scores were found at base line. The children in intervention group showed statistically significant reduction in MAS scores in all four limbs after six and 12 weeks of intervention (p < 0.05) in comparison with the control group. However, GMFM scores and GMFCS levels did not change significantly in intervention group as compared to control group. CONCLUSION: It is concluded that TM can effectively reduce the spasticity, does not have harmful effects, so can be administered safely by mothers at home and making it suitable for the management of spastic CP. However, in order to achieve better gross motor function, it should be practiced in conjunction with CPT, functional skills and task oriented approaches.

PMID: 31488980

14. Oral health-related quality of life in caregivers of individuals with Cerebral Palsy: a case-control study.
Alvarenga ÉDSL, Silva AM, da Silva TAE, de Araújo RF, Prado Júnior RR, Mendes RF.


AIM: The object of this study is to evaluate the oral health-related quality of life (OHRQoL) of caregivers of individuals with Cerebral Palsy (CP). METHODS: Ninety-eight caregivers of individuals with CP (SG) and 196 caregivers of individuals without special needs (CG) completed the reduced version of the Oral Health Impact Profile (OHIP-14). In addition, a questionnaire with demographic and socioeconomic questions was used. Groups were matched according to gender, schooling and family income. Fisher's exact tests, Chi square and Mann-Whitney, and bi/multivariate logistic regression were used (p < 0.05). RESULTS: The impact on OHRQoL was similar for SG and CG (OHIP-14 total score). For SG, the high negative impact was in the following OHIP domains: "Functional limitation", "Physical disability", "Psychological incapacity" and "Disadvantages". For SG, a higher number of caregivers was single, unemployed, received government financial aid. There was a statistically significant association between the number of children a caregiver has and a negative impact on OHRQoL. CONCLUSIONS: Being a caregiver of children with or without CP had a negative impact of similar magnitude on OHRQoL. The negative impact on OHRQoL of caregivers of children with CP was associated with having a high number of children; the higher the number of children, the greater the negative impact on their OHRQoL.

PMID: 31471856

15. Assessing support needs in children with intellectual disability and motor impairments: measurement invariance and group differences.
Aguayo V, Verdugo MA, Arias VB, Guillen VM, Amor AM.


BACKGROUND: This study assessed the equivalence of the measurement of support needs between children with intellectual disability (ID) and children with intellectual and motor disabilities (IMD) and compared both groups in the different domains of support. METHOD: The Supports Intensity Scale-Children's Version was used to assess the support needs of 713 children with ID and 286 children with IMD, mainly associated with cerebral palsy. RESULTS: The results supported measurement invariance between the group of ID and IMD, which allowed to conduct comparison between them. Children with IMD scored higher on support needs than did children without IMD, suggesting that children with IMD needed more support than their peers without motor impairments. Furthermore, the ID levels interacted with motor impairments: at the highest levels of ID, groups tended to be similar in support needs, with high scores and low variability. The greatest differences were found in the domains of Home and Community activities. CONCLUSIONS: This study points to the across-condition of the construct of support needs in populations with intellectual and developmental disabilities. However, additional mobility impairments should be considered during the evaluation and planning of systems of support. In this regard, the Supports Intensity Scale-Children's Version might have limitations when discriminating between samples with high support needs.

PMID: 31486142


STUDY OBJECTIVES: To describe the demographic and clinical characteristics of children with autism spectrum disorder (ASD) referred for polysomnography (PSG) and to look for predictors of obstructive sleep apnea (OSA) and severe OSA in these children. METHODS: This is a retrospective case series of children ages 2 to 18 years who underwent PSG between January 2009 and February 2015. Children were excluded if they had major comorbidities, prior tonsillectomy, or missing data. The following information was collected: age, sex, race, height, weight, tonsil size, and prior diagnosis of allergies, asthma, gastroesophageal reflux disease, seizure disorder, developmental delay, cerebral palsy, or attention deficit hyperactivity disorder. Predictors of OSA were evaluated. RESULTS: A total of 45 children were included with a mean (standard deviation [SD]) age of 6.1 years (2.8). The patients were 80% male, 49% Hispanic, 27% African American, 22% Caucasian, and 2.2% other. Of these children 26 (58%) had OSA (apnea-hypopnea index [AHI] > 1 event/h) and 15 (33%) were obese (body mass index, body mass index z-score ≥ 95th percentile). The mean (SD) AHI was 7.7 (15.0) events/h (range 1.0–76.6). A total of 9 (20%) had severe OSA (AHI ≥ 10 events/h). There were no demographic or clinical predictors of OSA in this group. However, increasing weight served as a predictor of severe OSA and African American or Hispanic children were more likely obese. CONCLUSIONS: The absence of demographic or clinical predictors of OSA supports using general indications for PSG in children with ASD.

PMID: 31483247

17. Parental Knowledge, Attitude, and Perception about Epilepsy and Sociocultural Barriers to Treatment.
Rani A, Thomas PT.


BACKGROUND AND PURPOSE: The present study focused on assessing parental knowledge, attitudes, and perceptions about epilepsy as well as addressing the socio-cultural barriers to its treatment. METHODS: Data were collected from outpatient consultations in the neurology department of a tertiary referral center in South India. Parents of sixty children suffering from epilepsy in the age-group of 4–15 years were interviewed to explore their knowledge, attitudes, and perceptions about epilepsy. They were recruited in 2015 over a consecutive period of six months. The tools administered were: socio-demographic schedule; clinical profile; a knowledge, attitude, and perception questionnaire prepared by the researcher; and a few case studies with psychosocial interventions. RESULTS: The mean age of the parents who brought their children to the hospital was 37.2 years, with 71.7% being male, of which, 36% were educated up to secondary/intermediate level and were of lower socio-economic status. The mean age of the children with epilepsy was 8.4 years with 66.7% of them being male. Among them, 50% had the most commonly occurring generalized seizures and 26.7% had the co-morbid condition of cerebral palsy. Around 37.7% parents attributed the seizures to evil spirits or supernatural powers, 52.5% to mental illness, and 72.1% were influenced by their families to initially seek religio-spiritual or traditional treatment in desperation for a cure of the illness. In total, 91.8% of the parents visited holy places, made "mannats", or prayed in worship for hours for their child's recovery. CONCLUSIONS: Creating awareness about epilepsy is important to address the socio-cultural barriers to its treatment and improve help-seeking behavior.

PMID: 31482058

18. Reduction in respiratory exacerbation rate in patients with severe bilateral cerebral palsy following daily PEP-mask therapy: a retrospective study.
Di Pede C, Colombo E, Duso M, Conte D, Marcon V, Vianello A, Masiero S, Martinuzzi A.


BACKGROUND: Respiratory complications caused by the inability to protect the upper airways and ineffective cough represent a major cause of morbidity and mortality in patients with cerebral palsy (CP). Even though the application of Positive End-Expiratory Pressure (PEP) through a face mask has gained large popularity as a technique to prevent bronchial mucous encumbrance, its long term effects on clinical course and respiratory function in individuals with CP have not been investigated. AIM: To investigate whether regular application of PEP through a face mask can improve clinical status and respiratory function in patients with severe CP. DESIGN: Observational, retrospective cohort study. SETTING: The outpatient
rehabilitation unit of the IRCCS E. Medea Rehabilitation Hospital -Conegliano, Italy. POPULATION: CP outpatients admitted to the unit between January 1, 2006 and December 31, 2018. METHODS: All the medical records of the enrolled patients were collected and reviewed. All patients underwent multidisciplinary respiratory evaluation at T0 (immediately before the beginning of PEP-use) and T1 (12 months after). The evaluation assessed respiratory infections history (number of exacerbations per year), blood gas analysis, measurement of airway resistance through the interrupter technique. STATISTICAL ANALYSIS: Descriptive statistics was applied for data analysis employing SPSS 16.0 software for Windows. RESULTS: Twenty-one patients affected with CP (mean age 9,19 years, SD 5,56, range 3-23, 8 females) were included. All patients had more than 3 infections per year (mean 4,81, SD 1,17) in the year prior to treatment (T0). At T1 mean number of infections was 1,57 (SD 0,81); 17 patients (80%) reported less than three infections; two patients (10%) reported zero infections, two patients (10 %) reported three infections. Blood gas analysis and airway resistance values did not show a significant difference at T0 and T1. CONCLUSIONS: Daily PEP-mask therapy reduces frequency of respiratory exacerbations in patients with severe bilateral CP. CLINICAL REHABILITATION IMPACT: PEP-mask is a valuable rehabilitative tool in severe CP patients with frequent respiratory exacerbations.

PMID: 31489811

19. Intrathecal baclofen toxicity in a patient with acute kidney injury.
Bowman A, Ayyangar R, Gonzales I, Hornyak J.

A 9-year old male patient with a past medical history of congenital cytomegalovirus (CMV) infection and spastic quadriplegic cerebral palsy with an intrathecal baclofen pump was admitted to a tertiary care hospital with respiratory depression and unresponsiveness for approximately two days. He had a recent two-week hospital stay for respiratory failure due to pneumonia. After being prescribed antibiotics and being sent home, he had developed copious diarrhea. On readmission, he was found to be dehydrated and in acute renal failure. A physical exam revealed hypotonia throughout, in a patient who typically had spasticity with contractures. The Pediatric Rehabilitation Medicine service was consulted for possible baclofen toxicity. Some signs and symptoms of baclofen toxicity include respiratory depression, seizures, CNS depression, hypotonia, hypotension, absent deep tendon reflexes, lethargy, ataxia, and cardiac arrhythmias. His intrathecal baclofen (ITB) dose was reduced, and signs/symptoms of ITB overdose began to resolve. As renal function improved, spasticity returned, necessitating increase in ITB dosing toward the premorbid dose.

PMID: 31476182

20. [Cerebral palsy associated urological pathologies. Nurse’s role.]
Arch Esp Urol. 2019 Sep;72(7):634-640. [Article in Spanish; Abstract available in Spanish from the publisher]

OBJECTIVES: The objectives of this study were: To analyze the causes of urological consultation of the child with CP, to analyze the role of nursing in the urological care of children with CP referred to Urology, and to know the relationship between the child's urinary tract infection and CP and its degree of independence. METHOD: Retrospective analytical observational study based on the review of the clinical records of patients diagnosed with cerebral palsy. Forty-seven patients selected by simple randomization in an age range of 2 to 16 years were included in the study in an outpatient clinic for CP patients located in a town in northern Mexico. RESULTS: The causes of urological consultation of the child with CP, referred by nursing were: urinary infection, phimosis, retractable testicle, cryptorchidism, hypogonadism, overactive bladder, and hypospadias. The relationship between the urinary infection of the child with CP and its degree of independence was established with the level of urinary sphincter control. CONCLUSIONS: The nursing staff is a key and decisive factor in the diagnosis, early reference for treatment and monitoring of the evolution of urinary disorders in children with CP. It is not indicated to start a toilet training program in children with CP, without having previously ruled out a urinary tract infection.

PMID: 31475673

21. [Randomized clinical trials of early acupuncture treatment of limb paralysis in traumatic brain injury patients and its mechanism].
Guo ZQ, Huang Y, Jiang H, Wang WB.
OBJECTIVE: To observe the clinical effect of early acupuncture treatment of limb paralysis in patients with traumatic brain injury (TBI) and changes of serum interleukin-6 (IL-6), brain-derived neurotrophic factor (BDNF) and nerve growth factor (NGF) levels, so as to explore its mechanism underlying improvement of TBI. METHODS: A total of 70 TBI inpatients were equally divided into a medication group and an acupuncture plus medication group according to a random number table. The medication contained intravenous drip of Mannitol Injection (125 mL, once every 8 h) and Oxiracetam Injection (4 g, once a day). Starting 72 h after TBI, acupuncture therapy was applied to main points as Fenglong (ST40), Zusanli (ST36), Guanyuan (CV4), Baihui (GV20), Shuigou (GV26) and Fengchi (GB20), etc. The treatment was given once a day for total 28 days. Before and after the treatment, plasma IL-6, BDNF and NGF contents were detected using radioimmunoassay, the volume of the injured brain tissue was detected by using CT scan. The neurological deficit severity was evaluated by using Glasgow Coma Scale (GCS), and the degree of activity of daily living (ADL) ability was assessed by using simplified Fugl-Meyer assessment (FMA) scale, and modified Barthel index (BI), separately. RESULTS: After the treatment, the GCS score on day 28, FMA and ADL-BI scores on day 28 and 60 were significantly increased in both medication and acupuncture plus medication groups in comparison with their own pre-treatment (P<0.05). The focal volume values of the injured brain were significantly decreased on day 14 and 28 in both groups compared with their own pre-treatment (P<0.05). The therapeutic effect of acupuncture plus medication was evidently superior to that of simple medication in lowering focal injured volume on day 14 and 28, and in increasing FMA and ADL-BI scores on day 28 and 60 (P<0.05). Compared with pre-treatment, the levels of plasma IL-6 on day 3, 7 and 14 were significantly decreased, and those of plasma BDNF and NGF on day 3, 7 and 14 considerably increased in both groups in comparison with their own pre-treatment (P<0.05). The therapeutic effect of acupuncture plus medication was evidently superior to that of simple medication in lowering IL-6 on day 3 and 7, and in increasing BDNF and NGF levels on day 3, 7 and 14 (P<0.05). CONCLUSION: Early acupuncture treatment can significantly improve the TBI patient's limb motor function and daily life activities, which may be related with its effects in reducing the inflammation and increasing BDNF and NGF levels.

PMID: 31475493

22. Analysis of Direct Monthly Cost of Outpatient Hospital-Based Care for Children With Cerebral Palsy in Kano, Nigeria.
Badaru UM, Abdulrahman H, Ahmad RY, Lawal IU, Zakari MK.


BACKGROUND: Children with cerebral palsy require effective, accessible and affordable medical and rehabilitation care. OBJECTIVE: The aim of this study was to evaluate the direct monthly cost of outpatient hospital-based care for children with cerebral palsy (CP) in Kano City, Nigeria. METHODS: The study was a cross-sectional survey. Consenting participants were recruited using the purposive sampling technique. Data on cost of medical and physiotherapy consultations, number of consultations per month, cost of diagnostic investigations, and out-of-pocket expenditures were captured using a researcher-designed questionnaire. Data were analyzed with descriptive statistics using Microsoft Excel and SPSS version 20. RESULTS: A total of 106 children with CP and their caregivers participated in this study. The mean age of the children was 3.18 ± 1.90 years and that of their caregivers was 27.32 ± 4.63 years. The average direct cost of outpatient care per month was ₦14 295.38 (Nigerian naira) ($46.87) ± ₦13 211.52 ($43.32). The average monthly cost of physiotherapy was ₦503.77 ($1.65) ± ₦220.79 ($0.72), whereas those for transportation and radiological investigations were ₦1861.49 ($6.10) ± ₦1435.06 ($4.71) and ₦3771.46 ($12.37) ± ₦5135.32 ($16.84), respectively. CONCLUSION: The average direct monthly cost of providing outpatient hospital-based care for children with CP in Kano City, Nigeria may not be affordable because most of the participants earned very meager monthly incomes. The highest medical cost was incurred from radiological investigation, whereas transportation was the most important out-of-pocket cost. The Nigerian government should make a policy decision for the automatic enrollment of all children diagnosed with CP into the National Health Insurance Scheme.

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23. Induction of regional chemokine expression in response to human umbilical cord blood cell infusion in the neonatal mouse ischemia-reperfusion brain injury model.


Regenerative medicine using umbilical cord blood (UCB) cells shows promise for the treatment of cerebral palsy. Although the efficacy of this therapy has been seen in the clinic, the mechanisms by which UCB cells interact and aid in the improvement of symptoms are not clear. We explored the chemokine expression profile in damaged brain tissue in the neonatal mouse ischemia-reperfusion (IR) brain injury model that was infused with human UCB (hUCB) cells. IR brain injury was induced in 9-day-old NOD/SCID mice. hUCB cells were administered 3 weeks post brain injury. Chemokine expression profiles in the brain extract were determined at various time points. Inflammatory chemokines such as CCL1, CCL17, and CXCL12 were transiently upregulated by 24 hours post brain injury. Upregulation of other chemokines, including CCL5, CCL9, and CXCL1 were prolonged up to 3 weeks post brain injury, but most chemokines dissipated over time. There were marked increases in levels of CCL2, CCL12, CCL20, and CX3CL1 in response to hUCB cell treatment, which might be related to the new recruitment and differentiation of neural stem cells, leading to the induction of tissue regeneration. We propose that the chemokine expression profile in the brain shifted from responding to tissue damage to inducing tissue regeneration. hUCB cell administration further enhanced the production of chemokines, and chemokine networks may play an active role in tissue regeneration in neonatal hypoxic-ischemic brain injury.

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Mild traumatic brain injury is an all-too-common outcome from modern warfare and sport, and lacks a reproducible model for assessment of potential treatments and protection against it. Here we consider the use of surface acoustic wave (SAW) irradiation of C. elegans worms-without cavitation-as a potential, ethically reasonable animal-on-a-chip model for inducing traumatic brain injury in an animal, producing significant effects on memory and learning that could prove useful in a model that progress from youth to old age in but a few weeks. We show a significant effect by SAW on the ability of worms to learn post-exposure through associative learning chemotaxis. At higher SAW intensity, we find immediate, thorough, but temporary paralysis of the worms. We further explore the importance of homogeneous exposure of the worms to the SAW-driven ultrasound, an aspect poorly controlled in past efforts, if at all, and demonstrate the absence of cavitation through a change in fluids from a standard media for the worms to the exceedingly viscous polyvinyl alcohol. Likewise, we demonstrate that acoustic streaming, when present, is not directly responsible for paralysis nor learning disabilities induced in the worm, but is beneficial at low amplitudes to ensuring homogeneous ultrasound exposure.

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