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Interventions and Management

1. Effect of twister wrap orthosis on foot pressure distribution and balance in diplegic cerebral palsy.

Eid MA, Aly SM, Mohamed RA.

J Musculoskelet Neuronal Interact. 2018 Dec 1;18(4):543-550.

OBJECTIVES: To evaluate the effectiveness of twister wrap orthosis (TWO) on foot pressure distribution and postural balance in children with spastic diplegic cerebral palsy (CP). **METHODS:** Thirty children with spastic diplegic CP, with ages ranging from 6 to 8 years, were assigned randomly into two groups. The control group received the conventional physical therapy and ankle foot orthosis (AFO), whereas the study group received the same program as the control group in addition to TWO. Measurement of foot pressure distribution using a pressure platform as well as stability indices using the Biodex Stability System was performed before and after 12 weeks of the treatment program. **RESULTS:** Both groups showed a significant increase in mean and peak planter pressure on forefoot and rear foot with a significant decrease on mid foot after treatment ($P<0.05$). The study group showed a significant improvement in balance after treatment ($P<0.05$) while there was no significant difference in the control group. After treatment, the study group showed significant improvement in planter pressure and balance compared with the control group ($P<0.05$). **CONCLUSIONS:** TWO could provide correction of foot pressure distribution and improve postural balance in children with spastic diplegic CP.

PMID: [30511958](#)

2. Classifying motor coordination impairment in Para swimmers with brain injury.

Hogarth L, Payton C, Nicholson V, Spathis J, Tweedy S, Connick M, Beckman E, Van de Vliet P, Burkett B.

J Sci Med Sport. 2018 Nov 22. pii: S1440-2440(18)30600-5. doi: 10.1016/j.jsams.2018.11.015. [Epub ahead of print]

OBJECTIVES: The International Paralympic Committee has mandated that International Sport Federations develop sport-specific classification systems that are evidence-based. This study examined the predictive and convergent validity of instrumented tapping tasks to classify motor coordination impairments in Para swimming. **DESIGN:** Cross-sectional. **METHODS:** Thirty non-disabled participants and twenty-one Para swimmers with brain injury completed several instrumented tapping tasks as an assessment of upper and lower limb motor coordination. Para swimmers also completed a maximal freestyle swim to obtain a performance measure. The predictive and convergent validity of instrumented tapping tasks was examined by establishing differences in test measures between participants with and without brain injury and defining the strength of association between test measures and maximal freestyle swim speed in Para swimmers, respectively. **RESULTS:** Random forest successfully classified 96% of participants with and without brain injury using test measures derived from instrumented tapping tasks. Most test measures had moderate to high correlations ($r=0.54$ to 0.72 ; $p<0.01$) with maximal freestyle swim speed and collectively explained up to 72% of the variance in maximal freestyle swim performance in Para swimmers with brain injury. **CONCLUSIONS:** The results of this study evidence the predictive and convergent validity

of instrumented tapping tasks to classify motor coordination impairments in Para swimmers with brain injury. These tests can be included in revised Para swimming classification to improve the objectivity and transparency in determining athlete eligibility and sport class for these Para athletes.

PMID: [30503355](#)

3. Factors associated with pain in adolescents with bilateral cerebral palsy.

Fairhurst C, Shortland A, Chandler S, Will E, Scrutton D, Simonoff E, Baird G.

Dev Med Child Neurol. 2018 Dec 3. doi: 10.1111/dmcn.14113. [Epub ahead of print]

AIM: We explored factors associated with pain and its severity in a population cohort of young people with bilateral cerebral palsy, comparing parent/carer and young people self-reports. METHOD: Of 278 survivors (mean age 16y 8mo, SD 1y 4mo, range 13y 8mo-19y 3mo) from the South Thames in the Study of Hips and Physical Experience cohort of 338 young people with bilateral cerebral palsy, 212 parents/carers and 153 young people completed questionnaires on the presence, severity, timing, site, associated factors, impact, and treatment of pain. RESULTS: Seventy per cent of parents/carers reported pain within 3 months, 59% the previous week, and 50% the previous day with 56% reporting 'regularly experienced'. Of young people able to do so, 63% reported pain within 3 months, 50% the previous week, and 42% the previous day, with 48% reporting regular pain. There was strong agreement between the parent/carer and young people, reporting pain severity over the previous 3 months. Pain severity was associated with increased motor impairment and comorbidity, particularly constipation, spasticity, equipment use, and higher emotional score, but not sex, intellectual disability, speech, or maternal education. Multiple sites of musculoskeletal pain were reported in two-thirds of individuals. Pain was associated with voluntary movement in individuals with less motor impairment and with being moved in those with severe motor impairment. Greater pain severity had a negative effect on both physical and psychological quality of life. INTERPRETATION: Increasing awareness of the comorbidities in cerebral palsy may aid effective treatment, reducing pain experienced by young people with cerebral palsy. WHAT THIS STUDY ADDS: Regular moderate or severe pain is reported in young people with bilateral cerebral palsy (CP) in all Gross Motor Function Classification System levels. Pain is reported more frequently in young people who are non-ambulant. General ill health is strongly associated with severity of pain after controlling for severity of CP, especially constipation. Pain occurs most often in ambulant young people during voluntary activity and in those who are non-ambulant when being moved. There is strong agreement between parents/carers and young people about pain presence and severity.

PMID: [30508224](#)

4. Prevalence and characteristics of pain in children and young adults with cerebral palsy: a systematic review.

Mckinnon CT, Meehan EM, Harvey AR, Antolovich GC, Morgan PE.

Dev Med Child Neurol. 2018 Dec 3. doi: 10.1111/dmcn.14111. [Epub ahead of print]

AIM: The primary aim of this review is to evaluate the evidence for pain prevalence in children and young adults with cerebral palsy. Secondary aims are to identify pain characteristics and types of pain measurement used in this population. METHOD: Ovid MEDLINE, Embase, CINAHL Plus, and PubMed were searched in October 2016 and updated in November 2017. Two authors independently screened studies according to Preferred Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Pain outcomes were categorized within a biopsychosocial pain framework, with pain prevalence extracted for all recall periods and measurement types. RESULTS: One hundred and six publications from 57 studies met inclusion criteria. Pain prevalence varied widely from 14 per cent to 76 per cent and was higher in females, older age groups, and those classified within Gross Motor Function Classification System level V. Pain was most frequent in the lower limbs, back, and abdomen and associated with reduced quality of life or health status. The influence of pain on psychological functioning, interference, and participation was inconclusive. INTERPRETATION: Variation exists in reported pain prevalence because of sampling bias, inconsistent measurement, varying recall periods, and use of different participant age ranges. WHAT THIS PAPER ADDS: Pain prevalence varies from 14 per cent to 76 per cent in children and young adults with cerebral palsy. Pain is more prevalent in females, older age groups, and children in Gross Motor Function Classification System level V.

PMID: [30508221](#)

5. Oriental Herbal Medicine for Neurological Disorders in Children: An Overview of Systematic Reviews.

Lee B, Kwon CY, Chang GT.

Am J Chin Med. 2018 Dec 6:1-26. doi: 10.1142/S0192415X18500866. [Epub ahead of print]

Oriental herbal medicine (OHM) has been widely used in pediatric neurological disorders and has attracted attention as a safe and effective treatment. We aim to summarize and evaluate the evidence for OHM in pediatric neurological disorders for evidence-based decision-making. Without language restrictions, up-to-date research data were obtained from nine electronic databases. Systematic reviews (SRs) assessing the efficacy of OHM for pediatric neurological disorders were included. The methodological quality of each review was assessed using the AMSTAR instrument. The quality of evidence for the main findings was evaluated using the GRADE approach. Sixteen SRs comprising 169 randomized controlled trials with 19,542 participants were included. In epilepsy (six SRs, n=5,341), OHM as an adjunctive or alternative therapy to antiepileptic drugs showed higher clinical symptom improvements than did antiepileptic drugs alone. The Activities of Daily Living scale score was significantly higher in children with cerebral palsy (one SR, n=508) when OHM was added to rehabilitation. There were inconsistent results for tic disorder (four SRs, n=9,870) and enuresis (two SRs, n=1,995) and unclear results for attention deficit hyperactivity disorder (two SRs, n=1,261) and autism spectrum disorder (one SR, n=567). Eleven SRs reported adverse events, but no fatal adverse reaction was reported. The methodological quality of the included reviews was medium-to-high. The overall quality of evidence ranged from "very low" to "moderate." In conclusion, the efficacy of OHM is promising for some pediatric neurological disorders such as epilepsy and cerebral palsy. However, more high-quality evidence is needed to make clinical recommendations on OHM use.

PMID: [30518236](#)

6. The Clinical Utility of Virtual Reality in Neurorehabilitation: A Systematic Review.

Massetti T, da Silva TD, Crocetta TB, Guarnieri R, de Freitas BL, Bianchi Lopes P, Watson S, Tonks J, de Mello Monteiro CB.

J Cent Nerv Syst Dis. 2018 Nov 27;10:1179573518813541. doi: 10.1177/1179573518813541. eCollection 2018.

BACKGROUND: Virtual reality (VR) experiences (through games and virtual environments) are increasingly being used in physical, cognitive, and psychological interventions. However, the impact of VR as an approach to rehabilitation is not fully understood, and its advantages over traditional rehabilitation techniques are yet to be established. **METHOD:** We present a systematic review which was conducted according to Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). During February and March of 2018, we conducted searches on PubMed (Medline), Virtual Health Library Search Portal databases (BVS), Web of Science (WOS), and Embase for all VR-related publications in the past 4 years (2015, 2016, 2017, and 2018). The keywords used in the search were "neurorehabilitation" AND "Virtual Reality" AND "devices." **RESULTS:** We summarize the literature which highlights that a range of effective VR approaches are available. Studies identified were conducted with poststroke patients, patients with cerebral palsy, spinal cord injuries, and other pathologies. Healthy populations have been used in the development and testing of VR approaches meant to be used in the future by people with neurological disorders. A range of benefits were associated with VR interventions, including improvement in motor functions, greater community participation, and improved psychological and cognitive function. **CONCLUSIONS:** The results from this review provide support for the use of VR as part of a neurorehabilitation program in maximizing recovery.

PMID: [30515028](#)

7. Risk management and provider liabilities in infantile cerebral palsy based on malpractice litigation cases.

Zhou L, Li H, Li C, Li G.

J Forensic Leg Med. 2018 Nov 25;61:82-88. doi: 10.1016/j.jflm.2018.11.010. [Epub ahead of print]

AIM: Infantile cerebral palsy (CP) severely affects the survival and quality of life of infants. CP is typically caused by multiple factors, leading to causal uncertainty of the role of medical errors in CP and resulting in frequent medical disputes. No relevant research exists on risk management and malpractice liabilities in CP, including in China. **METHOD:** A retrospective analysis of 400 CP malpractice litigation cases from 18th June 1999 to 23rd November 2017, collected from China Judgments Online, included basic case information, CP risk factors, medical errors, medical malpractice liability determination, and compensation. **RESULTS:** Up to 63.5% of infants with CP were affected by asphyxia, followed by hypoxic-ischemic encephalopathy (63.3%), neonatal infection (52.3%) and intracranial hemorrhage (36.0%). Most (89.1%) of civil judgments resulted in liability for

medical errors, with the highest proportion of ultimate liability. The three most frequent medical errors were failure of completing delivery in time (30.2%), incomplete assessment of birth process detection (28.8%), and nonstandard medical records (25.3%). Each case involved 2.5 medical errors on average. No difference in the distribution of medical errors between premature and full-term CP infants ($P > 0.05$) was found. Compensation for damage was awarded in 91.4% of claims, and the mean value of compensation was \$73,506. The mean value of the total actual loss of the family was \$128,198.

INTERPRETATION: Contradictions between the doctors and patients were prominent in malpractice CP litigation cases, with a total loss of \$3.97 billion attributable to new CP cases in China in 2017. Asphyxia was the most frequent risk factor for CP since it may easily draw the attention of the sufferer's family. Medical service providers did not pay attention to risk management in preterm infants. The importance of fetal monitoring and standardized medical record writing should be emphasized.

PMID: [30502590](#)

8. The Importance of Registers in our Understanding of Cerebral Palsy.

Reddihough D, Reid S.

J Paediatr Child Health. 2018 Dec;54(12):1403-1404. doi: 10.1111/jpc.14279.

PMID: [30506771](#)

Prevention and Cure

9. Early Caffeine Administration and Neurodevelopmental Outcomes in Preterm Infants.

Lodha A, Entz R, Synnes A, Creighton D, Yusuf K, Lapointe A, Yang J, Shah PS; investigators of the Canadian Neonatal Network (CNN) and the Canadian Neonatal Follow-up Network (CNFUN).

Pediatrics. 2018 Dec 5. pii: e20181348. doi: 10.1542/peds.2018-1348. [Epub ahead of print]

BACKGROUND: Although caffeine use for apnea of prematurity is well studied, the long-term safety and benefit of routine early caffeine administration has not been explored. Our objective was to determine the association between early (within 2 days of birth) versus late caffeine exposure and neurodevelopmental outcomes in preterm infants. METHODS: Infants of <29 weeks' gestation born between April 2009 and September 2011 and admitted to Canadian Neonatal Network units and then assessed at Canadian Neonatal Follow-up Network centers were studied. Neonates who received caffeine were divided into early- (received within 2 days of birth) and late-caffeine (received after 2 days of birth) groups. The primary outcome was significant neurodevelopmental impairment, defined as cerebral palsy, or a Bayley Scales of Infant and Toddler Development, Third Edition composite score of <70 on any component, hearing aid or cochlear implant, or bilateral visual impairment at 18 to 24 months' corrected age. RESULTS: Of 2108 neonates who were eligible, 1545 were in the early-caffeine group and 563 were in the late-caffeine group. Rates of bronchopulmonary dysplasia, patent ductus arteriosus, and severe neurologic injury were lower in the early-caffeine group than in the late-caffeine group. Significant neurodevelopmental impairment (adjusted odds ratio 0.68 [95% confidence interval 0.50-0.94]) and odds of Bayley Scales of Infant and Toddler Development, Third Edition cognitive scores of <85 (adjusted odds ratio 0.67 [95% confidence interval 0.47-0.95]) were lower in the early-caffeine group than in the late-caffeine group. Propensity score-based matched-pair analyses revealed lower odds of cerebral palsy and hearing impairment only. CONCLUSIONS: Early caffeine therapy is associated with better neurodevelopmental outcomes compared with late caffeine therapy in preterm infants born at <29 weeks' gestation.

PMID: [30518670](#)

10. Comparison of Cerebral Palsy Severity Between 2 Eras of Antenatal Magnesium Use.

Stetson BT, Buhimschi CS, Kellert BA, Hay K, Buhimschi IA, Maitre NL.

JAMA Pediatr. 2018 Dec 3. doi: 10.1001/jamapediatrics.2018.3827. [Epub ahead of print]

PMID: [30508016](#)