

Science Infos

Paralysie Cérébrale



FONDATION
PARALYSIE CÉRÉBRALE
LA FONDATION MOTRICE

N°29 – OCTOBRE 2016

Focus

E.S.PA.CE

Enquête Nationale sur les SOINS RECUS, les BESOINS PERCUS et les priorités d'AMELIORATION en rééducation motrice rapportés par les personnes atteintes de paralysie cérébrale et leur famille.

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Manifestations et congrès

Décembre 2016

Pédiadol 23^{ème} journées « La douleur de l'enfant : quelles réponses »

5-7 décembre 2016

Paris, France

<https://www.pediadol.org/23emes-Journees-La-douleur-de-l.html>

Congrès Posture Equilibre Mouvement

Faculté de Médecine de Nancy

8-10 décembre 2016

Nancy, France

http://pem-nancy2016.event.univ-lorraine.fr/pem_accueil.php

Innovation, Robotique et Santé :Assistance à la conduite de fauteuil roulant

Réseau Breizh Paralyse Cérébrale

9 décembre 2016

Rennes, France

<https://sites.google.com/site/innorobosante/>

Journées d'Etude annuelles du CDI

12-13 décembre 2016

Paris, France

<http://www.institutmc.org/index.php/journee-d-etude-annuelles-du-cdi-12-et-13-decembre-2016>

Janvier 2017

27^{ème} congrès de la Société Française de Neurologie Pédiatrique

18-20 janvier 2017

Paris, France

<http://www.sfneuroped.fr/nos-missions/congres-sfnp/>

Mai 2017

29th Annual EACD Meeting,

17-20 mai 2017

Amsterdam, Pays-Bas

<http://www.eacd2017.org/>

Publications scientifiques

Méthodologie de la recherche

Le profil de veille a été mis en place sur Pubmed avec le mot clé "Cerebral Palsy" pour des publications majoritairement en français ou en anglais, avec abstract ou full text

Free article indique le lien vers les articles dont le texte intégral est librement disponible

Epidémiologie

⚡Prévalence- Incidence

School Performance and Neurodevelopment of Very Low Birth Weight Preterm Infants: First Report From Turkey.

Koç Ö, Kavuncuoğlu S, Ramoğlu MG, Aldemir E, Aktalay A, Eras Z

J Child Neurol. 2016 Feb;31(2):170-6. doi: 10.1177/0883073815587028. Epub 2015 May 26.

Very low birth weight preterm infants are under significant risk of neurologic, developmental, and somatic problems. In this study, 90 infants born with a birth weight <1500 g and/or with a gestational age <32 weeks were evaluated after the first year of elementary school to assess neurodevelopment. The Wechsler Intelligence Scale for Children-Revised (WISC-R) test, Pediatric Symptom Checklist, and Parent Evaluation of Developmental Status were performed. Mental retardation, cerebral palsy, blindness, epilepsy, and posthemorrhagic hydrocephaly incidences were 14%, 7%, 2%, 5%, and 2%, respectively. The WISC-R score of 32 patients (35.5%) were below 85. Perinatal asphyxia, abnormal neurologic examination, and delayed or impaired speech correlated significantly with low WISC-R scores. Education and income of the father had positive impact on WISC-R scores (P = .042 and P = .026). Parents' concern and presence of cognitive problems were correlated (P = .026). Environmental factors, as well as the prevention of morbidity, affected school performance positively.

© The Author(s) 2015.

DOI: 10.1177/0883073815587028

PMID: 26012506 [PubMed - indexed for MEDLINE]

⚡Facteurs de risque – Causes

Association of severe placental inflammation with death prior to discharge and cerebral palsy in preterm infants.

Huetz N, Triau S, Leboucher B, Sentilhes L, Hanf M, Nguyen S, Flamant C, Roze JC, Gascoin G

BJOG. 2016 Nov;123(12):1956-1963. doi: 10.1111/1471-0528.14177. Epub 2016 Jul 18.

OBJECTIVE: The objective of our study was to identify placental patterns associated with death before discharge or cerebral palsy in a large cohort of preterm infants with a high follow-up rate at 2 years of corrected age.

DESIGN: Population-based monocentric study.

SETTINGS: Monocentric study in the maternity unit of the University Hospital of Angers, France between 24(+0) and 33(+6) weeks of gestation, between January 2008 and December 2011.

POPULATION: All singleton infants born alive with a placental examination were eligible.

METHODS: Clinical data (obstetric and neonatal) were collected prospectively through the LIFT cohort. Placental data were collected retrospectively from medical records. The main outcome measure was death before discharge or cerebral palsy.

RESULTS: We did not find any significant association between severe inflammatory lesions on the placenta and death [odds ratio (OR) 1.49; 95% CI 0.55-4.01; P = 0.43] or cerebral palsy (OR 1.41; 95% CI 0.43-4.62; P = 0.57). This lack of significant association persisted even after adjustment (aOR 0.9; 95% CI 0.20-2.30; P = 0.54; aOR 0.98; 95% CI 0.27-3.58; P = 0.97).

CONCLUSION: Our results do not provide evidence for a significant association between severe inflammatory placental lesions and either death before discharge or cerebral palsy at 2 years of corrected age in preterm infants born at <34 weeks of gestational age. Further studies remain necessary to confirm this result.

TWEETABLE ABSTRACT: We found no significant association between inflammatory placental lesions and death or cerebral palsy.

© 2016 Royal College of Obstetricians and Gynaecologists.

DOI: 10.1111/1471-0528.14177

PMID: 27428037 [PubMed - in process]

Hypoxic ischemic encephalopathy in newborns linked to placental and umbilical cord abnormalities.

Nasiell J, Papadogiannakis N, Löf E, Elofsson F, Hallberg B

J Matern Fetal Neonatal Med. 2016 Mar;*29*(5):721-6. doi: 10.3109/14767058.2015.1015984. Epub 2015 Feb 25.

OBJECTIVE: Birth asphyxia and hypoxic ischemic encephalopathy (HIE) of the newborn remain serious complications. We present a study investigating if placental or umbilical cord abnormalities in newborns at term are associated with HIE.

MATERIALS AND METHODS: A prospective cohort study of the placenta and umbilical cord of infants treated with hypothermia (HT) due to hypoxic brain injury and follow-up at 12 months of age has been carried out. The study population included 41 infants treated for HT whose placentas were submitted for histopathological analysis. Main outcome measures were infant development at 12 months, classified as normal, cerebral palsy, or death. A healthy group of 100 infants without HIE and normal follow-up at 12 months of age were used as controls.

RESULTS: A velamentous or marginal umbilical cord insertion and histological abruption was associated with the risk of severe HIE, OR = 5.63, p = 0.006, respectively, OR = 20.3, p = 0.01 (multiple-logistic regression). Velamentous or marginal umbilical cord insertion was found in 39% among HIE cases compared to 7% in controls.

CONCLUSIONS: Placental and umbilical cord abnormalities have a profound association with HIE. A prompt examination of the placentas of newborns suffering from asphyxia can provide important information on the pathogenesis behind the incident and contribute to make a better early prognosis.

DOI: 10.3109/14767058.2015.1015984

PMID: 25714479 [PubMed - indexed for MEDLINE]

Neurological damage arising from intrapartum hypoxia/acidosis.

Rei M, Ayres-de-Campos D, Bernardes J

Best Pract Res Clin Obstet Gynaecol. 2016 Jan;*30*:79-86. doi: 10.1016/j.bpobgyn.2015.04.011. Epub 2015 Jun 21.

Complications occurring at any level of foetal oxygen supply will result in hypoxaemia, and this may ultimately lead to hypoxia/acidosis and neurological damage. Hypoxic-ischaemic encephalopathy (HIE) is the short-term neurological dysfunction caused by intrapartum hypoxia/acidosis, and this diagnosis requires the presence of a number of findings, including the confirmation of newborn metabolic acidosis, low Apgar scores, early imaging evidence of cerebral oedema and the appearance of clinical signs of neurological dysfunction in the first 48 h of life. Cerebral palsy (CP) consists of a heterogeneous group of nonprogressive movement and posture disorders, frequently accompanied by cognitive and sensory impairments, epilepsy, nutritional deficiencies and secondary musculoskeletal lesions. Although CP is the most common long-term neurological complication associated with intrapartum hypoxia/acidosis, >80% of cases are caused by other phenomena. Data on minor long-term neurological deficits are scarce, but they suggest that less serious intellectual and motor impairments may result from intrapartum hypoxia/acidosis. This chapter focuses on the existing evidence of neurological damage associated with poor foetal oxygenation during labour.

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DOI: 10.1016/j.bpobgyn.2015.04.011

PMID: 26148854 [PubMed - indexed for MEDLINE]

Pathophysiology of foetal oxygenation and cell damage during labour.

Yli BM, Kjellmer I.

Best Pract Res Clin Obstet Gynaecol. 2016 Jan;*30*:9-21. doi: 10.1016/j.bpobgyn.2015.05.004. Epub 2015 Jun 21.

A foetus exposed to oxygenation compromise is capable of several adaptive responses, which can be categorised into those affecting metabolism and those affecting oxygen transport. However, both the extent and duration of the impairment in oxygenation will have a bearing on these adaptive responses. Although intrapartum events may account for no more than one-third of cases with an adverse neurological outcome, they are important because they can be influenced successfully. This review describes the mechanisms underlying foetal hypoxia during labour, acid-base balance and gas exchange, and the current scientific understanding of the role of intrauterine asphyxia in the pathophysiology of neonatal encephalopathy and cerebral palsy. Although the mechanisms involved include similar initiating events, principally ischaemia and excitotoxicity, and similar final common pathways to cell death, there are certain unique maturational factors that influence the type and pattern of cellular injury.

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DOI: 10.1016/j.bpobgyn.2015.05.004

PMID: 26211833 [PubMed - indexed for MEDLINE]

Perspectives in neonatal and childhood arterial ischemic stroke.

Fluss J, Dinomais M, Kossotoroff M, Vuillerot C, Darteyre S, Chabrier S

Expert Rev Neurother. 2016 Oct 12:1-8. [Epub ahead of print]

INTRODUCTION: Over the last decade considerable advances have been made in the identification, understanding and management of pediatric arterial ischemic stroke. Such increasing knowledge has also brought new perspectives and interrogations in the current acute and rehabilitative care of these patients. Areas covered: In developed countries, focal cerebral arteriopathy is one of the most common causes of arterial ischemic stroke in childhood and imaging features are well characterized. However, there are ongoing debates regarding its underlying mechanisms, natural evolution and proper management. The implementation of thrombolytic therapy in acute pediatric stroke has been shown to be efficient in anecdotal cases but is still limited by a number of caveats, even in large tertiary centers. Finally, neonatal stroke represents a unique circumstance of possible early intervention before the onset of any neurological disability but this appears meaningful only in a selective group of neonates. **Expert commentary:** While perinatal stroke, a leading cause of cerebral palsy, appears to be multifactorial, a large number of childhood ischemic stroke are probably essentially triggered by infectious factors leading to vessel wall damage. Current research is aiming at better identifying risk factors in both conditions, and to define optimal acute and preventive therapeutic strategies in order to reduce significant long-term morbidity.

DOI: 10.1080/14737175.2017.1243471

PMID: 27687767 [PubMed - as supplied by publisher]

Respiratory distress syndrome in moderately late and late preterm infants and risk of cerebral palsy: a population-based cohort study.

Thygesen SK, Olsen M, Østergaard JR, Sørensen HT

BMJ Open. 2016 Oct 11;6(10):e011643. doi: 10.1136/bmjopen-2016-011643.

OBJECTIVES: Infant respiratory distress syndrome (IRDS) is a known risk factor for intracerebral haemorrhage/intraventricular haemorrhage (ICH/IVH) and periventricular leucomalacia. These lesions are known to increase the risk of cerebral palsy (CP). Thus, we wanted to examine the long-term risk of CP following IRDS in moderately late and late preterm infants.

DESIGN: Population-based cohort study.

SETTING: All hospitals in Denmark.

PARTICIPANTS: We used nationwide medical registries to identify a cohort of all moderately and late preterm infants (defined as birth during 32-36 full gestational weeks) born in Denmark in 1997-2007 with and without hospital diagnosed IRDS.

MAIN OUTCOMES MEASURES: We followed study participants from birth until first diagnosis of CP, emigration, death or end of follow-up in 2014. We computed the cumulative incidence of CP before age 8 years and used Cox's regression analysis to compute HRs of IRDS, comparing children with IRDS to those without IRDS. HRs were adjusted for multiple covariates.

RESULTS: We identified 39 420 moderately late and late preterm infants, of whom 2255 (5.7%) had IRDS. The cumulative incidence of CP was 1.9% in infants with IRDS and 0.5% in the comparison cohort. The adjusted HR of CP

was 2.0 (95% CI 1.4 to 2.9). The adjusted HR of CP was 12 (95% CI 4.5 to 34) in children with IRDS accompanied by a diagnosis of ICH/IVH. After restriction to children without diagnoses of perinatal breathing disorders other than IRDS, congenital heart disease and viral or bacterial infections occurring within 4 days of birth, the overall adjusted HR was 2.1 (95% CI 1.4 to 3.1).

CONCLUSIONS: The risk of CP was increased in moderately late and late preterm infants with IRDS compared with infants without IRDS born during the same gestational weeks.

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DOI: 10.1136/bmjopen-2016-011643

PMID: 27729347 [PubMed - in process]

Lésions - Prévention des lésions

+Données fondamentales

Combined in utero hypoxia-ischemia and lipopolysaccharide administration in rats induces chorioamnionitis and a fetal inflammatory response syndrome.

Maxwell JR, Denson JL, Joste NE, Robinson S, Jantzie LL

Placenta. 2015 Dec;36(12):1378-84. doi: 10.1016/j.placenta.2015.10.009. Epub 2015 Oct 23

INTRODUCTION: Preterm birth is a major cause of infant morbidity and long-term disability, and is associated with numerous central nervous system (CNS) deficits. Infants exposed to intrauterine inflammation, specifically chorioamnionitis, are at risk for very early preterm birth and neurological complications including cerebral palsy, epilepsy, and behavioral and cognitive deficits. However, placenta-brain axis abnormalities and their relationship to subsequent permanent CNS injury remain poorly defined.

METHODS: Intrauterine injury was induced in rats on embryonic day 18 (E18) by transient systemic hypoxia-ischemia (TSHI) and intra-amniotic lipopolysaccharide (LPS) injection. Placenta, brain and serum were collected from E19 to postnatal day 0 (P0). Histology, TUNEL staining, western blot and multiplex immunoassays were used to quantify placental and brain abnormalities, and fetal serum cytokine levels.

RESULTS: Prenatal TSHI + LPS caused acute and subacute placental injury hallmarked by inflammatory infiltrate, edema, hemorrhage and cell death along with placental increases in IL-1 β and TNF α . TSHI + LPS increased a diverse array of circulating inflammatory proteins including IL-1 β , TNF α , IL-6, IL-10, IL-4, IFN γ and CXCL1, both immediately after TSHI + LPS and in live born pups. CNS inflammation was characterized by increased CXCL1.

DISCUSSION: Prenatal TSHI + LPS in rats induces placental injury and inflammation histologically consistent with chorioamnionitis, concomitant with elevated serum and CNS pro-inflammatory cytokines. This model accurately recapitulates key pathophysiological processes observed in extremely preterm infants including placental, fetal, and CNS inflammation. Further investigation into the mechanism of CNS injury following chorioamnionitis and the placental-brain axis will guide the use of future interventions.

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DOI: 10.1016/j.placenta.2015.10.009

PMID: 26601766 [PubMed - indexed for MEDLINE]

Motor Cortex Plasticity in Children With Spastic Cerebral Palsy: A Systematic Review.

de Almeida Carvalho Duarte N, Collange Grecco LA, Zanon N, Galli M, Fregni F, Santos Oliveira C

J Mot Behav. 2016 Oct 18:1-10. [Epub ahead of print]

A review of the literature was performed to answer the following questions: Does motor cortex excitability correlate with motor function? Do motor cortex excitability and cortex activation change after a rehabilitation program that results in improvements in motor outcomes? Can the 10-20 electroencephalography (EEG) system be used to locate
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the primary motor cortex when employing transcranial direct current stimulation? Is there a bihemispheric imbalance in individuals with cerebral palsy similar to what is observed in stroke survivors? the authors found there is an adaptation in the geometry of motor areas and the cortical representation of movement is variable following a brain lesion. The 10-20 EEG system may not be the best option for locating the primary motor cortex and positioning electrodes for noninvasive brain stimulation in children with cerebral palsy.

DOI: 10.1080/00222895.2016.1219310

PMID: 27754798 [PubMed - as supplied by publisher]

PPAR γ -induced upregulation of CD36 enhances hematoma resolution and attenuates long-term neurological deficits after germinal matrix hemorrhage in neonatal rats.

Flores JJ, Klebe D, Rolland WB, Lekic T, Krafft PR, Zhang JH.

Neurobiol Dis. 2016 Mar;*87*:124-33. doi: 10.1016/j.nbd.2015.12.015. Epub 2015 Dec 29.

Germinal matrix hemorrhage remains the leading cause of morbidity and mortality in preterm infants in the United States with little progress made in its clinical management. Survivors are often afflicted with long-term neurological sequelae, including cerebral palsy, mental retardation, hydrocephalus, and psychiatric disorders. Blood clots disrupting normal cerebrospinal fluid circulation and absorption after germinal matrix hemorrhage are thought to be important contributors towards post-hemorrhagic hydrocephalus development. We evaluated if upregulating CD36 scavenger receptor expression in microglia and macrophages through PPAR γ stimulation, which was effective in experimental adult cerebral hemorrhage models and is being evaluated clinically, will enhance hematoma resolution and ameliorate long-term brain sequelae using a neonatal rat germinal matrix hemorrhage model. PPAR γ stimulation (15d-PGJ2) increased short-term PPAR γ and CD36 expression levels as well as enhanced hematoma resolution, which was reversed by a PPAR γ antagonist (GW9662) and CD36 siRNA. PPAR γ stimulation (15d-PGJ2) also reduced long-term white matter loss and post-hemorrhagic ventricular dilation as well as improved neurofunctional outcomes, which were reversed by a PPAR γ antagonist (GW9662). PPAR γ -induced upregulation of CD36 in macrophages and microglia is, therefore, critical for enhancing hematoma resolution and ameliorating long-term brain sequelae.

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PMCID: PMC4724557 [Available on 2017-03-01]

PMID: 26739391 [PubMed - indexed for MEDLINE]

Données cliniques

A new anti-microbial combination prolongs the latency period, reduces acute histologic chorioamnionitis as well as funisitis, and improves neonatal outcomes in preterm PROM.

Lee J, Romero R, Kim SM, Chaemsaitong P, Park CW, Park JS, Jun JK, Yoon BH

J Matern Fetal Neonatal Med. 2016 Mar;*29*(5):707-20. doi: 10.3109/14767058.2015.1020293. Epub 2015 Sep 16.

OBJECTIVE: Antibiotic administration is a standard practice in preterm premature rupture of membranes (PROM). Specific anti-microbial agents often include ampicillin and/or erythromycin. Anaerobes and genital mycoplasmas are frequently involved in preterm PROM, but are not adequately covered by antibiotics routinely used in clinical practice. Our objective was to compare outcomes of PROM treated with standard antibiotic administration versus a new combination more effective against these bacteria.

STUDY DESIGN: A retrospective study compared perinatal outcomes in 314 patients with PROM <34 weeks receiving anti-microbial regimen 1 (ampicillin and/or cephalosporins; n = 195, 1993-2003) versus regimen 2 (ceftriaxone, clarithromycin and metronidazole; n = 119, 2003-2012). Intra-amniotic infection/inflammation was assessed by positive amniotic fluid culture and/or an elevated amniotic fluid MMP-8 concentration (>23 ng/mL).

RESULTS: (1) Patients treated with regimen 2 had a longer median antibiotic-to-delivery interval than those with regimen 1 [median (interquartile range) 23 d (10-51 d) versus 12 d (5-52 d), p < 0.01]; (2) patients who received regimen 2 had lower rates of acute histologic chorioamnionitis (50.5% versus 66.7%, p < 0.05) and funisitis (13.9% versus 42.9%, p < 0.001) than those who had received regimen 1; (3) the rates of intra-ventricular hemorrhage (IVH) and cerebral palsy (CP) were significantly lower in patients allocated to regimen 2 than regimen 1 (IVH: 2.1% versus

19.0%, $p < 0.001$ and CP: 0% versus 5.7%, $p < 0.05$); and (4) subgroup analysis showed that regimen 2 improved perinatal outcomes in pregnancies with intra-amniotic infection/inflammation, but not in those without intra-amniotic infection/inflammation (after adjusting for gestational age and antenatal corticosteroid administration).
CONCLUSION: A new antibiotic combination consisting of ceftriaxone, clarithromycin, and metronidazole prolonged the latency period, reduced acute histologic chorioamnionitis/funisitis, and improved neonatal outcomes in patients with preterm PROM. These findings suggest that the combination of anti-microbial agents (ceftriaxone, clarithromycin, and metronidazole) may improve perinatal outcome in preterm PROM.

DOI: 10.3109/14767058.2015.1020293

PMID: 26373262 [PubMed - indexed for MEDLINE]

Age-Specific Dynamics of Corpus Callosum Development in Children and its Peculiarities in Infantile Cerebral Palsy.

Krasnoshchekova EI, Zykin PA, Tkachenko LA, Aleksandrov TA, Sereda VM, Yalifimov AN

Bull Exp Biol Med. 2016 Oct 25. [Epub ahead of print]

The age dynamics of corpus callosum development was studied on magnetic resonance images of the brain in children aged 2-11 years without neurological abnormalities and with infantile cerebral palsy. The areas of the total corpus callosum and its segments are compared in the midsagittal images. Analysis is carried out with the use of an original formula: proportion of areas of the anterior (genu, CC2; and anterior part, CC3) and posterior (isthmus, CC6 and splenium, CC7) segments: $kCC = (CC2 + CC3) \times CC6 / CC7$. The results characterize age-specific dynamics of the corpus callosum development and can be used for differentiation, with high confidence, of the brain of children without neurological abnormalities from the brain patients with infantile cerebral palsy.

DOI: 10.1007/s10517-016-3528-6

PMID: 27783284 [PubMed - as supplied by publisher]

Association of Neurodevelopmental Outcomes and Neonatal Morbidities of Extremely Premature Infants With Differential Exposure to Antenatal Steroids.

Chawla S, Natarajan G, Shankaran S, Pappas A, Stoll BJ, Carlo WA, Saha S, Das A, Laptook AR, Higgins RD; National Institute of Child Health and Human Development Neonatal Research Network.

JAMA Pediatr. 2016 Oct 10. doi: 10.1001/jamapediatrics.2016.1936. [Epub ahead of print]

Importance: Many premature infants are born without exposure to antenatal steroids (ANS) or with incomplete courses. This study evaluates the dose-dependent effect of ANS on rates of neonatal morbidities and early childhood neurodevelopmental outcomes of extremely premature infants.

Objective: To compare rates of neonatal morbidities and 18- to 22-month neurodevelopmental outcomes of extremely premature infants exposed to no ANS or partial or complete courses of ANS.

Design, Setting, and Participants: In this observational cohort study, participants were extremely premature infants (birth weight range, 401-1000 g; gestational age, 22-27 weeks) who were born at participating centers of the National Institute of Child Health and Human Development Neonatal Research Network between January 2006 and December 2011. Data were analyzed between October 2013 and May 2016.

Main Outcomes and Measures: Rates of death or neurodevelopmental impairment at 18 to 22 months' corrected age. Neurodevelopmental impairment was defined as the presence of any of the following: moderate to severe cerebral palsy, a cognitive score less than 85 on the Bayley Scales of Infant and Toddler Development III, blindness, or deafness.

Results: There were 848 infants in the no ANS group, 1581 in the partial ANS group, and 3692 in the complete ANS group; the mean (SD) birth weights were 725 (169), 760 (173), and 753 (170) g, respectively, and the mean (SD) gestational ages were 24.5 (1.4), 24.9 (2), and 25.1 (1.1) weeks. Of 6121 eligible infants, 4284 (70.0%) survived to 18- to 22-month follow-up, and data were available for 3892 of 4284 infants (90.8%). Among the no, partial, and complete ANS groups, there were significant differences in the rates of mortality (43.1%, 29.6%, and 25.2%, respectively), severe intracranial hemorrhage among survivors (23.3%, 19.1%, and 11.7%), death or necrotizing enterocolitis (48.1%, 37.1%, and 32.5%), and death or bronchopulmonary dysplasia (74.9%, 68.9%, and 65.5%). Additionally, death or neurodevelopmental impairment occurred in 68.1%, 54.4%, and 48.1% of patients in the no, partial, and complete ANS groups, respectively. Logistic regression analysis revealed that complete (odds ratio, 0.63; 95% CI, 0.53-0.76) and partial (odds ratio, 0.77; 95% CI, 0.63-0.95) ANS courses were associated with lower rates of death or neurodevelopmental impairment compared with the no ANS group. The reduction in the rate of death or

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neurodevelopmental impairment associated with exposure to a complete ANS course may be mediated through a reduction in rates of severe intracranial hemorrhage and/or cystic periventricular leukomalacia in the neonatal period.

Conclusions and Relevance: Antenatal steroid exposure was associated with a dose-dependent protective effect against death or neurodevelopmental impairment in extremely preterm infants. The effect was partly mediated by ANS-associated reductions in rates of severe intracranial hemorrhage and/or cystic periventricular leukomalacia. These results support prompt administration of ANS, with the goal of a complete course prior to delivery.

DOI: 10.1001/jamapediatrics.2016.1936

PMID: 27723868 [PubMed - as supplied by publisher]

Introduction: Why is intrapartum foetal monitoring necessary - Impact on outcomes and interventions.

Ayres-de-Campos D

Best Pract Res Clin Obstet Gynaecol. 2016 Jan;30:3-8. doi: 10.1016/j.bpobgyn.2015.06.004. Epub 2015 Jun 23.

Maintaining maternal oxygen supply is essential for foetal life, and labour constitutes an increased challenge to this. Good clinical judgement is required to evaluate the signs of reduced foetal oxygenation, to diagnose the underlying cause, to judge the reversibility of the condition and to determine the best timing for delivery. The main aim of intrapartum foetal monitoring is to identify foetuses that are being inadequately oxygenated, enabling appropriate action before the occurrence of injury. It is also to provide reassurance in cases of adequate foetal oxygenation, and thus to avoid unnecessary obstetric intervention. Poor foetal oxygenation is diagnosed by documenting metabolic acidosis in the umbilical cord immediately after birth or in the newborn circulation during the first minutes of life. However, most newborns recover quickly, and they do not develop relevant short- or long-term complications. Hypoxic-ischaemic encephalopathy is the short-term neurological dysfunction caused by inadequate intrapartum foetal oxygenation, and cerebral palsy of the spastic quadriplegic or dyskinetic types is the long-term neurological complication most commonly associated with it. Although there is insufficient evidence from randomised controlled trials to demonstrate that any form of intrapartum foetal monitoring reduces the incidence of adverse outcomes, reports from the clinical setting have documented a decrease in metabolic acidosis, hypoxic-ischaemic encephalopathy and intrapartum death over the last decades. It may be difficult to demonstrate the benefit of diagnostic techniques in complex environments such as the labour ward, but a reduction in the incidence of adverse clinical outcomes constitutes important evidence that intrapartum foetal monitoring makes a difference.

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PMID: 26189688 [PubMed - indexed for MEDLINE]

Long term motor function after neonatal stroke: Lesion localization above all.

Dinomais M, Hertz-Pannier L, Groeschel S, Chabrier S, Delion M, Husson B, Kossorotoff M, Renaud C, Nguyen The Tich S; AVCnn Study Group.

Hum Brain Mapp. 2015 Dec;36(12):4793-807. doi: 10.1002/hbm.22950. Epub 2015 Sep 10.

Motor outcome is variable following neonatal arterial ischemic stroke (NAIS). We analyzed the relationship between lesion characteristics on brain MRI and motor function in children who had suffered from NAIS. Thirty eight full term born children with unilateral NAIS were investigated at the age of seven. 3D T1- and 3D FLAIR-weighted MR images were acquired on a 3T MRI scanner. Lesion characteristics were compared between patients with and without cerebral palsy (CP) using the following approaches: lesion localization either using a category-based analysis, lesion mapping as well as voxel-based lesion-symptom mapping (VLSM). Using diffusion-weighted imaging the microstructure of the cortico-spinal tract (CST) was related to the status of CP by measuring DTI parameters. Whereas children with lesions sparing the primary motor system did not develop CP, CP was always present when extensive lesions damaged at least two brain structures involving the motor system. The VLSM approach provided a statistical map that confirmed the cortical lesions in the primary motor system and revealed that CP was highly correlated with lesions in close proximity to the CST. In children with CP, diffusion parameters indicated microstructural changes in the CST at the level of internal capsule and the centrum semiovale. White matter damage of the CST in centrum semiovale was a highly reproducible marker of CP. This is the first description of the implication of this latter region in motor impairment after NAIS. In conclusion, CP in childhood was closely linked to the location of the infarct in the motor system.

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Melatonin in the management of perinatal hypoxic-ischemic encephalopathy: light at the end of the tunnel?

Hendaus MA, Jomha FA, Alhammadi AH

Neuropsychiatr Dis Treat. 2016 Sep 27;12:2473-2479. eCollection 2016.

Perinatal hypoxic-ischemic encephalopathy (HIE) affects one to three per 1,000 live full-term births and can lead to severe and permanent neuropsychological sequelae, such as cerebral palsy, epilepsy, mental retardation, and visual motor or visual perceptive dysfunction. Melatonin has begun to be contemplated as a good choice in order to diminish the neurological sequelae from hypoxic-ischemic brain injury. Melatonin emerges as a very interesting medication, because of its capacity to cross all physiological barriers extending to subcellular compartments and its safety and effectiveness. The purpose of this commentary is to detail the evidence on the use of melatonin as a neuroprotection agent. The pharmacologic aspects of the drug as well as its potential neuroprotective characteristics in human and animal studies are described in this study. Melatonin seems to be safe and beneficial in protecting neonatal brains from perinatal HIE. Larger randomized controlled trials in humans are required, to implement a long-awaited feasible treatment in order to avoid the dreaded sequelae of HIE.

[Free PMC Article](#)

DOI: 10.2147/NDT.S115533

PMID: 27729791 [PubMed - in process]

[Prevention of preterm birth complications by antenatal corticosteroid administration]. [Article in French]

Schmitz T(1).

J Gynecol Obstet Biol Reprod (Paris). 2016 Oct 21. pii: S0368-2315(16)30109-0. doi: 10.1016/j.jgyn.2016.09.008. [Epub ahead of print]

OBJECTIVE: To evaluate short- and long-term benefits and risks associated with antenatal administration of a single course of corticosteroids and the related strategies: multiple and rescue courses.

METHODS: The PubMed database, the Cochrane Library and the recommendations from the French and foreign obstetrical societies or colleges have been consulted.

RESULTS: Antenatal administration of a single course of corticosteroids before 34 weeks of gestation is associated in the neonatal period with a significant reduction of respiratory distress syndrome (RDS), intraventricular hemorrhage (IVH), necrotizing enterocolitis (NEC) and death (LE1), and in possibly childhood with a reduction of cerebral palsy and increased psychomotor development index and intact survival (LE3). However, this treatment is associated with alterations of the HPA axis response persisting until 8 weeks after birth (LE2) and possibly with insulin resistance in adulthood (LE3). Antenatal corticosteroid administration after 34 weeks is associated, with high number needed to treat, with reduced respiratory morbidity (LE2), with no significant effect on neurological (LE2) or digestive (LE2) morbidities. Because of a very favourable benefit/risk balance, antenatal administration of a single course of corticosteroids is recommended for women at risk of preterm delivery before 34 weeks (grade A). The minimum gestational age for treatment will depend on the threshold chosen to start neonatal intensive care in maternity units and perinatal networks (Professional consensus). After 34 weeks, evidences are not consistent enough to recommend systematic antenatal corticosteroid treatment (grade B), however, a course might be indicated in the clinical situations associated with the higher risk of "severe" RDS, mainly in case of planned cesarean delivery (gradeC). In case of imminent preterm birth, pre-empting the second betamethasone injection is not recommended (gradeC), because this policy might be associated with increased rates of NEC (LE3). Repeated antenatal corticosteroid administration is associated in the neonatal period with respiratory benefits (LE1) but decreased birth weight (LE1) and, in childhood, with possible neurological impairment (LE2). Therefore, this strategy is not recommended (grade A). Rescue courses are only associated with neonatal respiratory benefits (LE2). Because of the possible adverse effects associated with this strategy when delivery occurs during the 24hours following the first injection and because of the doubts raised by repeated courses, rescue courses are not recommended (Professional consensus). It is not possible to recommend one corticosteroid (betamethasone or dexamethasone) over another (Professional consensus). In case of contraindication for the intramuscular (IM) route, the intravenous route might be proposed (Professional consensus). The oral route is not recommended (grade A) because of increased rates of

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IVH and neonatal sepsis in comparison with the IM route (LE1). Either betamethasone as 2 injections of 12mg 24hours apart or dexamethasone as 4 injections of 6mg 12hours apart is recommended (grade A). Antenatal corticosteroid-induced alterations of fetal heart rate and movements should be recognized by the care providers of women at risk of preterm birth to avoid unjustified decision of labor induction or cesarean (Professional consensus). Gestational diabetes and pre-existing diabetes are not contraindication to antenatal corticosteroid therapy (Professional consensus). However, caution should be exercised in women with poorly controlled type 1 diabetes (Professional consensus). The apprehension to provoke maternal or neonatal infection should not delay antenatal corticosteroid administration even in case of preterm premature rupture of membranes (grade A).

CONCLUSION: Antenatal corticosteroid administration is recommended to every woman at risk of preterm delivery before 34 weeks of gestation (grade A). Repeated courses of antenatal corticosteroids are not recommended (grade A). Rescue courses are not recommended (Professional consensus).

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PMID: 27776846 [PubMed - as supplied by publisher]

Reducing the risk of fetal distress with sildenafil study (RIDSTRESS): a double-blind randomised control trial.

Dunn L, Flenady V, Kumar S

J Transl Med. 2016 Jan 14;14:15. doi: 10.1186/s12967-016-0769-0.

BACKGROUND: Labour is perhaps the most hazardous time in pregnancy. As many as 20 % of cerebral palsy cases in term infants result from intrapartum events and up to 63 % of babies who develop intrapartum compromise have no prior risk factors. Sildenafil citrate (SC), a phosphodiesterase 5 inhibitor, improves uterine blood supply through vasodilatation and potentially could improve placental perfusion and hence reduce the risk of intrapartum fetal hypoxia. The aim of this study is to evaluate the efficacy of SC to reduce the risk of intrapartum fetal compromise and the need for emergency operative delivery.

METHODS/DESIGN: This is a single centre, double-blind, randomised, phase II clinical trial of SC or placebo given during labour to women (18-50 years of age) with a single, appropriately grown, non-anomalous baby at term (37-42 weeks gestation). Those with cardiovascular, renal, hepatic, ocular or hypertensive disease or contraindication to SC will be excluded. Participants will be randomised to either SC 50 mg or placebo capsules eight hourly (SC maximum 150 mg) to commence when admitted to birth suite for management of labour. Within 3 h of the first dose, a repeat ultrasound scan will be performed to measure any changes in uteroplacental and fetal Doppler indices. Labour will continue otherwise in accordance with hospital clinical guidelines. The primary outcome is emergency caesarean section for intrapartum fetal compromise. Secondary outcomes include the effect of SC on fetal and uteroplacental blood flow, meconium liquor, fetal heart rate abnormalities and neonatal outcomes (admission to neonatal intensive care, Apgar <7 at 5 min, cord pH <7.1 or lactate >4.0 mmol/L, neonatal encephalopathy, death).

CONCLUSION: This is the first reported study evaluating the efficacy of SC on reducing the risk intrapartum fetal compromise.

TRIAL REGISTRATION: Australian New Zealand Clinical Trial Registry ACTRN12615000319572.

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DOI: 10.1186/s12967-016-0769-0

PMCID: PMC4712615

PMID: 26767411 [PubMed - indexed for MEDLINE]

Détection – Diagnostic

📌 Données cliniques

Brain magnetic resonance imaging and outcome after hypoxic ischaemic encephalopathy.

Hayes BC, Ryan S, McGarvey C, Mulvany S, Doherty E, Grehan A, Madigan C, Matthews T, King MD

J Matern Fetal Neonatal Med. 2016 Mar;29(5):777-82. doi: 10.3109/14767058.2015.1018167. Epub 2015 Sep 4.

OBJECTIVE: To correlate pattern of injury on neonatal brain magnetic resonance imaging (MRI) with outcome in infants ≥36 + 0 weeks gestation with hypoxic ischaemic encephalopathy.

METHODS: Prospective cohort study. Images were blindly reviewed. Children were assessed using a variety of standardised assessments.

RESULTS: MRI brain was performed on 88 infants. Follow up was available in 73(83%) infants. Eight of 25(32%) children with normal imaging had below normal assessment scores. Eight infants (12%) had isolated punctate white matter lesions and five of these had abnormal assessment scores. Death and cerebral palsy were seen only in children with imaging scores ≥ 3 on basal ganglia/thalami (BGT) score or ≥ 4 on watershed score. No developmental concerns were raised in 3/7(43%) infants with isolated watershed injury. Ten of 13(77%) infants with isolated BGT injury died or developed cerebral palsy. All 23 children with posterior limb of the internal capsule (PLIC) injury displayed developmental difficulties.

CONCLUSIONS: Almost one-third of infants with a normal MRI brain may be at risk of developmental problems. Punctate foci of white matter injury are common and not always benign. PLIC involvement is usually associated with neurological sequelae including isolated cognitive deficits. Worst outcomes are associated with basal ganglia injury.

DOI: 10.3109/14767058.2015.1018167

PMID: 25754207 [PubMed - indexed for MEDLINE]

Frequency-based features for early cerebral palsy prediction.

Rahmati H, Martens H, Aamo OM, Stavadahl Ø, Støen R, Adde L.

Conf Proc IEEE Eng Med Biol Soc. 2015;2015:5187-90. doi: 10.1109/EMBC.2015.7319560.

In this paper we aim at predicting cerebral palsy, the most serious and lifelong motor function disorder in children, at an early age by analysing infants' motion data. An essential step for doing so is to extract informative features with high class separability. We propose a set of features derived from frequency analysis of the motion data. Then, we evaluate the practicality of our features on one of the richest data sets collected to study this disease. In this data set, the motion data are extracted from both electromagnetic sensors as well as video camera. The proposed features are used for classifying both data sets. Using these features, we manage to achieve promising classification performance. Classification accuracy of 91% for the sensor data and 88% for the video-derived data show not only the advantage of employing these features for predicting cerebral palsy, but also that replacing electromagnetic sensors with a video camera is feasible.

DOI: 10.1109/EMBC.2015.7319560 PMID: 26737460 [PubMed - indexed for MEDLINE]

Optimization of MRI-based scoring scales of brain injury severity in children with unilateral cerebral palsy.

Pagnozzi AM, Fiori S, Boyd RN, Guzzetta A, Doecke J, Gal Y, Rose S, Dowson N

Pediatr Radiol. 2016 Feb;46(2):270-9. doi: 10.1007/s00247-015-3473-y. Epub 2015 Nov 10.

BACKGROUND: Several scoring systems for measuring brain injury severity have been developed to standardize the classification of MRI results, which allows for the prediction of functional outcomes to help plan effective interventions for children with cerebral palsy.

OBJECTIVE: The aim of this study is to use statistical techniques to optimize the clinical utility of a recently proposed template-based scoring method by weighting individual anatomical scores of injury, while maintaining its simplicity by retaining only a subset of scored anatomical regions.

MATERIALS AND METHODS: Seventy-six children with unilateral cerebral palsy were evaluated in terms of upper limb motor function using the Assisting Hand Assessment measure and injuries visible on MRI using a semiquantitative approach. This cohort included 52 children with periventricular white matter injury and 24 with cortical and deep gray matter injuries. A subset of the template-derived cerebral regions was selected using a data-driven region selection algorithm. Linear regression was performed using this subset, with interaction effects excluded.

RESULTS: Linear regression improved multiple correlations between MRI-based and Assisting Hand Assessment scores for both periventricular white matter (R squared increased to 0.45 from 0, $P < 0.0001$) and cortical and deep gray matter (0.84 from 0.44, $P < 0.0001$) cohorts. In both cohorts, the data-driven approach retained fewer than 8 of the 40 template-derived anatomical regions.

CONCLUSION: The equal or better prediction of the clinically meaningful Assisting Hand Assessment measure using fewer anatomical regions highlights the potential of these developments to enable enhanced quantification of injury and prediction of patient motor outcome, while maintaining the clinical expediency of the scoring approach.

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DOI: 10.1007/s00247-015-3473-y

PMID: 26554854 [PubMed - indexed for MEDLINE]

The Baby Moves prospective cohort study protocol: using a smartphone application with the General Movements Assessment to predict neurodevelopmental outcomes at age 2 years for extremely preterm or extremely low birthweight infants.

Spittle AJ, Olsen J, Kwong A, Doyle LW, Marschik PB, Einspieler C, Cheong J

BMJ Open. 2016 Oct 3;6(10):e013446. doi: 10.1136/bmjopen-2016-013446.

INTRODUCTION: Infants born extremely preterm (EP; <28 weeks' gestation) and/or with extremely low birth weight (ELBW; <1000 g birth weight) are at increased risk for adverse neurodevelopmental outcomes. However, it is challenging to predict those EP/ELBW infants destined to have long-term neurodevelopmental impairments in order to target early intervention to those in most need. The General Movements Assessment (GMA) in early infancy has high predictive validity for neurodevelopmental outcomes in preterm infants. However, access to a GMA may be limited by geographical constraints and a lack of GMA-trained health professionals. Baby Moves is a smartphone application (app) developed for caregivers to video and upload their infant's general movements to be scored remotely by a certified GMA assessor. The aim of this study is to determine the predictive ability of using the GMA via the Baby Moves app for neurodevelopmental impairment in infants born EP/ELBW.

METHODS AND ANALYSIS: This prospective cohort study will recruit infants born EP/ELBW across the state of Victoria, Australia in 2016 and 2017. A control group of normal birth weight (>2500 g birth weight), term-born (≥37 weeks' gestation) infants will also be recruited as a local reference group. Parents will video their infant's general movements at two time points between 3 and 4 months' corrected age using the Baby Moves app. Videos will be scored by certified GMA assessors and classified as normal or abnormal. Parental satisfaction using the Baby Moves app will be assessed via survey. Neurodevelopmental outcome at 2 years' corrected age includes developmental delay according to the Bayley Scales of Infant and Toddler Development-III and cerebral palsy diagnosis.

ETHICS AND DISSEMINATION: This study was approved by the Human Research and Ethics Committees at the Royal Children's Hospital, The Royal Women's Hospital, Monash Health and Mercy Health in Melbourne, Australia. Study findings will be disseminated via peer-reviewed publications and conference presentations.

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PMID: 27697883 [PubMed - in process]

White Matter Injury and General Movements in High-Risk Preterm Infants.

Peyton C, Yang E, Msall ME, Adde L, Støen R, Fjørtoft T, Bos AF, Einspieler C, Zhou Y, Schreiber MD, Marks JD, Drobyshevsky A

AJNR Am J Neuroradiol. 2016 Oct 27. [Epub ahead of print]

BACKGROUND AND PURPOSE: Very preterm infants (birth weight, <1500 g) are at increased risk of cognitive and motor impairment, including cerebral palsy. These adverse neurodevelopmental outcomes are associated with white matter abnormalities on MR imaging at term-equivalent age. Cerebral palsy has been predicted by analysis of spontaneous movements in the infant termed "General Movement Assessment." The goal of this study was to determine the utility of General Movement Assessment in predicting adverse cognitive, language, and motor outcomes in very preterm infants and to identify brain imaging markers associated with both adverse outcomes and aberrant general movements.

MATERIALS AND METHODS: In this prospective study of 47 preterm infants of 24-30 weeks' gestation, brain MR imaging was performed at term-equivalent age. Infants underwent T1- and T2-weighted imaging for volumetric analysis and DTI. General movements were assessed at 10-15 weeks' postterm age, and neurodevelopmental outcomes were evaluated at 2 years by using the Bayley Scales of Infant and Toddler Development III.

RESULTS: Nine infants had aberrant general movements and were more likely to have adverse neurodevelopmental outcomes, compared with infants with normal movements. In infants with aberrant movements, Tract-Based Spatial Statistics analysis identified significantly lower fractional anisotropy in widespread white matter tracts, including the corpus callosum, inferior longitudinal and fronto-occipital fasciculi, internal capsule, and optic radiation. The subset

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of infants having both aberrant movements and abnormal neurodevelopmental outcomes in cognitive, language, and motor skills had significantly lower fractional anisotropy in specific brain regions.

CONCLUSIONS: Aberrant general movements at 10-15 weeks' postterm are associated with adverse neurodevelopmental outcomes and specific white matter microstructure abnormalities for cognitive, language, and motor delays.

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DOI: 10.3174/ajnr.A4955

PMID: 27789448 [PubMed - as supplied by publisher]

Motricité - Mobilité – Posture

Annual changes in radiographic indices of the spine in cerebral palsy patients.

Lee SY, Chung CY, Lee KM, Kwon SS, Cho KJ, Park MS.

Eur Spine J. 2016 Mar;25(3):679-86. doi: 10.1007/s00586-014-3746-4. Epub 2015 Jan 9 Erratum in *Eur Spine J.* 2016 May;25(5):1641.

PURPOSE: We estimated the annual changes in radiographic indices of the spine in cerebral palsy (CP) patients and analyzed the factors that influence its progression rate.

METHODS: We included CP patients who had undergone whole-spine radiography more than twice and were followed for at least 1 year. The scoliosis Cobb angle, coronal balance, apical vertebral translation, apical rotation, and pelvic obliquity were measured on anteroposterior (AP) radiographs; thoracic kyphosis and lumbar lordosis angles, and sagittal balance was measured on lateral radiographs; and migration percentage was measured on AP hip radiographs to determine hip instability. For each gross motor function classification system (GMFCS) level, the Cobb angles, apical vertebral translation, coronal and sagittal balance, and pelvic obliquity were adjusted by multiple factors with a linear mixed model.

RESULTS: A total of 184 patients (774 radiographs) were included in this study. There was no significant annual change in scoliosis Cobb, thoracic kyphosis, and lumbar lordosis angles in the GMFCS level I-II and III groups. In the GMFCS level IV-V group, there was an annual increase of 3.4° in the scoliosis Cobb angle ($p = 0.020$). The thoracic kyphosis angle increased by 2.2° ($p = 0.018$) annually in the GMFCS level IV-V group. Apical vertebral translation increased by 5.4 mm ($p = 0.029$) annually in the GMFCS level IV-V group. Progression of coronal and sagittal balance and pelvic obliquity with aging were not statistically significant. Sex, hip instability, hip surgery, and triradiate cartilage did not affect the progression of scoliosis and the balance of the spine and pelvis.

CONCLUSIONS: The scoliosis Cobb angle, thoracic kyphosis angle, and apical vertebral translation in the GMFCS level IV-V CP patients progressed with age.

These findings can predict radiographic progression of scoliosis in CP patients.

DOI: 10.1007/s00586-014-3746-4

PMID: 25572149 [PubMed - indexed for MEDLINE]

Bimanual Fine Motor Function (BFMF) Classification in Children with Cerebral Palsy: Aspects of Construct and Content Validity.

Elvrum AK, Andersen GL, Himmelmann K, Beckung E, Öhrvall AM, Lydersen S, Vik T

Phys Occup Ther Pediatr. 2016;36(1):1-16. doi: 10.3109/01942638.2014.975314. Epub 2014 Nov 6.

The Bimanual Fine Motor Function (BFMF) is currently the principal classification of hand function recorded by the Surveillance of Cerebral Palsy in Europe (SCPE) register. The BFMF is used in a number of epidemiological studies, but has not yet been validated.

AIMS: To examine aspects of construct and content validity of the BFMF.

METHODS AND RESULTS: Construct validity of the BFMF was assessed by comparison with the Manual Ability Classification System (MACS) using register-based data from 539 children born 1999-2003 (304 boys; 4-12 years). The high correlation with the MACS (Spearman's rho = 0.89, CI: 0.86-0.91, $p < .001$) supports construct validity of the BFMF. The content of the BFMF was appraised through literature review, and by using the ICF-CY as a framework to compare the BFMF and MACS. The items hold, grasp and manipulate were found to be relevant to describe

increasingly advanced fine motor abilities in children with CP, but the description of the BFMF does not state whether it is a classification of fine motor capacity or performance.

CONCLUSION: Our results suggest that the BFMF may provide complementary information to the MACS regarding fine motor function and actual use of the hands, particularly if used as a classification of fine motor capacity.

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PMID: 25374154 [PubMed - indexed for MEDLINE]

Biomechanical and Clinical Correlates of Stance-Phase Knee Flexion in Persons With Spastic Cerebral Palsy.

Rha DW, Cahill-Rowley K, Young J, Torburn L, Stephenson K, Rose J

PM R. 2016 Jan;8(1):11-8; quiz 18. doi: 10.1016/j.pmrj.2015.06.003. Epub 2015 Jun 14.

OBJECTIVE: To identify biomechanical and clinical parameters that influence knee flexion (KF) angle at initial contact (IC) and during single limb stance phase of gait in children with spastic cerebral palsy (CP) who walk with flexed-knee gait.

DESIGN: Retrospective analysis of gait kinematics and clinical data collected from 2010-2013.

SETTING: Motion & Gait Analysis Laboratory at Lucile Packard Children's Hospital, Stanford, CA.

PARTICIPANTS: Gait analysis data from persons with spastic CP (Gross Motor Function Classification System [GMFCS] I-III) who had no prior surgery were analyzed. Participants exhibiting $KF \geq 20^\circ$ at IC were included; the more-involved limb was analyzed.

METHODS: Outcome measures were analyzed with respect to clinical findings, including passive range of motion, Selective Motor Control Assessment for the Lower Extremity (SCALE), gait kinematics, and musculoskeletal models of muscle-tendon lengths during gait.

MAIN OUTCOME MEASURES: KF at IC (KFIC) and minimum KF during single-limb support (KFSL) were investigated.

RESULTS: Thirty-four participants met the inclusion criteria, and their data were analyzed (20 males and 14 females, mean age 10.1 years, range 5-20 years). Mean KFIC was 34.4 ± 8.4 degrees and correlated with lower SCALE score ($\rho = -0.530$, $P = .004$), later peak KF during swing ($\rho = 0.614$, $P < .001$), and shorter maximal muscle length of the semimembranosus ($\rho = -0.359$, $P = .037$). Mean KFSL was 18.7 ± 14.9 and correlated to KF contracture ($\rho = 0.605$, $P < .001$) and shorter maximal muscle length of the semimembranosus ($\rho = -0.572$, $P < .001$) and medial gastrocnemius ($\rho = -0.386$, $P = .024$). GMFCS correlated more strongly to KFIC ($\rho = 0.502$, $P = .002$) than to KFSL ($\rho = 0.371$, $P = .031$). Linear regression found that both the SCALE score ($P = .001$) and delayed timing of peak KF during swing ($P = .001$) independently predicted KFIC. KF contracture ($P = .026$) and maximal length of the semimembranosus ($P = .043$) independently predicted KFSL.

CONCLUSION: Correlates of KFIC differed from those for KFSL and suggest that impaired selective motor control and later timing of swing-phase KF influence knee position at IC, whereas KF contracture and muscle lengths influence minimal KF in single-limb support, findings with important treatment implications.

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DOI: 10.1016/j.pmrj.2015.06.003

PMID: 26079863 [

Clinical evaluation of ultrasound screening in follow-up visits of infants with cerebral palsy at high risk for developmental dysplasia of the hip.

Qiu A, Yang Z, Wang J, Wang T.

Exp Ther Med. 2016 Oct;12(4):2431-2434. Epub 2016 Sep 2.

The aim of the study was to assess the clinical value of ultrasound screenings for the developmental dysplasia of the hip (DDH) and explore its etiology in high-risk infants with cerebral palsy in follow-up visits. A group of 98 cases of infants at high-risk of cerebral palsy who received rehabilitation treatment between July, 2009 and July, 2010 were selected. Infants included 58 men and 40 women, aged <6 months and not lost to follow-up visits. Ultrasound (using Graf static inspection) screening of hips was performed and the infants with abnormalities were given clinical intervention, and 1- to 2-year-old infants were given outpatient follow-ups. The results were analyzed and there were 40 abnormal cases among the 98 cases of infants at high risk of cerebral palsy, including 18 cases of unstable hip joint, and 22 cases of DDH (12 cases of hip dysplasia, 3 cases of hip subluxation and 7 cases of hip dislocation). Early clinical intervention for infants with hip dysplasia and outpatient follow up for infants aged 1–2 years was

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carried out and had ischemic necrosis of femoral head, with the exception of 1 case of femoral detorsion that was poorly restored. In conclusion, the probability of DDH was higher in infants at high-risk of cerebral palsy compared to the normal infants. Hip ultrasound is a safe, simple, and effective screening method for these infants, which is of great clinical significance for an earlier diagnosis and treatment of DDH in infants with cerebral palsy..

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DOI: 10.3892/etm.2016.3653

PMID: 27698744 [PubMed]

Dependence of Gait Deviation on Weight-Bearing Asymmetry and Postural Instability in Children with Unilateral Cerebral Palsy.

Domagalska-Szopa M, Szopa A, Czamara A

PLoS One. 2016 Oct 27;11(10):e0165583. doi: 10.1371/journal.pone.0165583. eCollection 2016.

Postural control deficits have been suggested to be a major component of gait disorders in children with cerebral palsy. The purpose of this study was to investigate the relationship between postural stability and treadmill walking, in children with unilateral cerebral palsy, by defining dependence between the posturographic weight-bearing distribution and center of pressure (CoP) sway during quiet standing with Gillette Gait Index and the 16 distinct gait parameters that composed the Gillette Gait Index. Forty-five children with unilateral cerebral palsy from 7-12 years of age were included in this study. A posturographic procedure and 3-dimensional instrumented gait analysis was developed. In general, across the entire tested group, the significant correlations concerned only the asymmetry of the weight bearing and a few of the distinct gait parameters that compose the Gillette Gait Index; moreover, correlation coefficients were low. The division of subjects into two clinical subgroups: children that exhibited a tendency to overload (1) and to underload (2) the affected body side, modified the results of the explored relationships. Our findings revealed that the difficulties experienced by children with hemiplegia while controlled in a standing position result from tendency to excessively or insufficiently load the affected lower limbs, and thus establishes a direct relationship with inadequate affected peak ankle DF in both stance and swing gait phases. Given the presented relationship between postural instability and deviation of the particular gait parameters in children with unilateral cerebral palsy, a follow-up study will be needed to determine the therapeutic approaches that will be most effective in promoting increased improvement in gait pattern, as well as the static and dynamic balance in standing.

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DOI: 10.1371/journal.pone.0165583

PMID: 27788247 [PubMed - in process]

Evaluation and management of crouch gait.

Kedem P, Scher DM.

Curr Opin Pediatr. 2016 Feb;28(1):55-9. doi: 10.1097/MOP.0000000000000316.

PURPOSE OF REVIEW: Crouch gait is defined as excessive ankle dorsiflexion, knee and hip flexion during the stance phase. This gait disorder is common among patients with cerebral palsy. The present article brings an up-to-date literature review on the pathoanatomy, natural history, and treatment of this frequent gait abnormality.

RECENT FINDINGS: Hamstrings are often not shortened in patients with crouch. Patella alta must be addressed if surgery is performed. Surgical correction of joint contractures and lever arm dysfunction can be effectively achieved through a single-event multilevel surgery.

SUMMARY: Crouch gait is a common gait deviation, often seen among ambulatory diplegic and quadriplegic patients, once they reach the pubertal spurt, when weak muscles can no longer support a toe walking pattern because of rapidly increased weight. This form of gait is highly ineffective and might compromise walking ability over time. The anterior knee is overloaded; pain, extensor mechanism failure, and arthritis might develop. Its progressive nature often requires surgical intervention. The cause of crouch gait is multifactorial, and surgery should be tailored to meet the individual's specific anatomic and physiologic abnormalities.

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PMID: 26709688 [PubMed - indexed for MEDLINE]

Gastrocnemius muscle-tendon interaction during walking in typically-developing

Kalsi G, Fry NR, Shortland AP

J Biomech. 2016 Oct 3;49(14):3194-3199. doi: 10.1016/j.jbiomech.2016.07.038. Epub 2016 Aug 8.

BACKGROUND: Our understanding of the interaction of muscle bellies and their tendons in individuals with muscle pathology is limited. Knowledge of these interactions may inform us of the effects of musculoskeletal pathologies on muscle-tendon dynamics and the subsequent neurological control strategies used in gait. Here, we investigate gastrocnemius muscle-tendon interaction in typically-developing (TD) adults and children, and in children with spastic cerebral palsy (SCP).

METHODS: We recruited six TD adults (4 female; mean age: 34 yrs. (24-54)), eight TD children (5 female; mean age: 10 yrs. (6-12)) and eight independently ambulant children with SCP (5 female; mean age 9 yrs. (6-12); 3 unilaterally-affected). A combination of 3D motion capture and 2D real-time ultrasound imaging were used to compute the gastrocnemius musculo-tendinous unit (MTU) length and estimate muscle belly and tendon lengths during walking. For the TD subjects, the measurements were made for heel-toe walking and voluntary toe-walking.

RESULTS: The gastrocnemius muscle bellies of children with SCP lengthened during single support ($p = 0.003$). In contrast, the muscle bellies of TD subjects did not demonstrate an increase in length over the period of single support under heel-toe or toe-walking conditions.

CONCLUSION: We observed lengthening of the gastrocnemius muscle bellies in children with SCP during single support, a phase of the gait cycle in which the muscle is reported consistently to be active. Repeated lengthening of muscle bellies while they are active may lead to muscle damage and have implications for the natural history of gait in this group.

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PMID: 27545082 [PubMed - in process]

Hypertonia Assessment Tool: Reliability and Validity in Children With Neuromotor Disorders.

Marsico P, Frontzek-Weps V, Balzer J, van Hedel HJ

J Child Neurol. 2016 Oct 14. pii: 0883073816671681. [Epub ahead of print]

The Hypertonia Assessment Tool is a 7-item instrument that discriminates spasticity, dystonia, and rigidity on 3 levels: item scores, subtype, and hypertonia diagnosis for each extremity. We quantified the inter- and intrarater reliability using Kappa statistics, Gwet's first-order agreement coefficient (both with 95% confidence interval), and percentage agreement for all levels. For validity, we compared the Hypertonia Assessment Tool subtype with the clinical diagnosis provided by the physicians. Two physiotherapists tested 45 children with neuromotor disorders. The interrater reliability ($n = 45$) of the Hypertonia Assessment Tool subtype was moderate to substantial whereas the intrarater reliability ($n = 42$) was almost perfect. The Hypertonia Assessment Tool showed good agreement in detecting spasticity. On the contrary, there was a higher presence of dystonia of 24% to 25% tested with the Hypertonia Assessment Tool compared to the clinical diagnosis. Even some individual items showed lower agreement between raters; the Hypertonia Assessment Tool subtypes and diagnosis were reliable. Validity of the Hypertonia Assessment Tool to test spasticity is confirmed, whereas, for dystonia and rigidity, further studies are needed.

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PMID: 27742862 [PubMed - as supplied by publisher]

Measuring physiological and pathological femoral anteversion using a biplanar low-dose X-ray system: validity, reliability, and discriminative ability in cerebral palsy.

Thépaut M, Brochard S, Leboucher J, Lempereur M, Stindel E, Tissot V, Borotikar BS

Skeletal Radiol. 2016 Feb;45(2):243-50. doi: 10.1007/s00256-015-2298-y. Epub 2015 Nov 27.

OBJECTIVE: The aims of this study were to evaluate the concurrent validity and reliability of a low-dose biplanar X-ray system (Ld-BPR) for the measurement of femoral anteversion (FA) by comparing Ld-BPR-based three-dimensional measures with CT-scan-based measures and to assess the discriminative ability of this method in children with cerebral palsy.

MATERIALS AND METHODS: Fifty dry femora were scanned using both a CT scan and the Ld-BPR system. Ten femora were artificially modified to mimic a range of anteversion from -30° to +60° and scanned by both modalities. FA was quantified using the images from both modalities and statistically compared for concurrent validity. Intra- and inter-observer reliability of the Ld-BPR system was also determined. Further, Ld-BPR data from 16 hemiplegic and 22 diplegic children were analyzed for its discriminative ability.

RESULTS: The concurrent validity between the Ld-BPR and CT-scan measures was excellent ($R(2) = 0.83-0.84$) and no significant differences were found. The intra- and inter-trial reliability were excellent (ICCs = 0.98 and 0.97) with limits of agreement of (-2.28°; +2.65°) and (-2.76°; +3.38°) respectively. Further, no significant effects of angle or method were found in the sample of modified femora. Ld-BPR measures for FA were significantly different between healthy and impaired femora.

CONCLUSIONS: The excellent concurrent validity with the CT scan modality, the excellent reliability, and the ability to discriminate pathological conditions evaluated by this study make this radiological method suitable for a validated use across hospitals and research institutes.

DOI: 10.1007/s00256-015-2298-y

PMID: 26611255 [PubMed - indexed for MEDLINE]

Multiprofessional evaluation in clinical practice: establishing a core set of outcome measures for children with cerebral palsy.

Mäenpää H(1), Autti-Rämö I(2), Varho T(3), Forsten W(4), Haataja L(4).

Dev Med Child Neurol. 2016 Oct 7. doi: 10.1111/dmcn.13289. [Epub ahead of print]

AIM: To develop a national consensus on outcome measures that define functional ability in children with cerebral palsy (CP) according to the International Classification of Functioning, Disability and Health (ICF) framework.

METHOD: The project started in 2008 in neuropaediatric units of two university hospitals and one outpatient clinic. Each professional group selected representatives to be knowledge brokers for their own specialty. Based on the evidence, expert opinion, and the ICF framework, multiprofessional teams selected the most valid measures used in clinical practice (2009-2010). Data from 269 children with CP were analysed, classified by the Gross Motor Function Classification System, Manual Ability Classification System, and Communication Function Classification System, and evaluated.

RESULTS: The process aimed at improving and unifying clinical practice in Finland through a national consensus on the core set of measures. The selected measures were presented by professional groups, and consensus was reached on the recommended core set of measures to be used in all hospitals treating children with CP in Finland.

INTERPRETATION: A national consensus on relevant and feasible measures is essential for identifying differences in the effectiveness of local practices, and for conducting multisite intervention studies. This project showed that multiprofessional rehabilitation practices can be improved through respect for and inclusion of everyone involved.

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PMID: 27714777 [PubMed - as supplied by publisher]

Reliability and Responsiveness of Upper Limb Motor Assessments for Children With Central Neuromotor Disorders: A Systematic Review.

Gerber CN(1), Labruyère R(2), van Hedel HJ(2).

Neurorehabil Neural Repair. 2016 Jan;30(1):19-39. doi: 10.1177/1545968315583723. Epub 2015 Apr 28.

BACKGROUND: To investigate the effectiveness of upper limb rehabilitation, sound measures of upper limb function, capacity, and performance are paramount.

OBJECTIVES: This systematic review investigates reliability and responsiveness of upper limb measurement tools used in pediatric neurorehabilitation.

METHODS: A 2-tiered search was conducted up to July 2014. The first search identified upper limb motor assessments for 1- to 18-year-old children with neuromotor disorders. The second search examined the psychometric properties of the tools. Methodological quality was rated according to COSMIN guidelines, and results for each tool were assembled in a "best evidence synthesis." Furthermore, we delineated whether tools were

unimanual or bimanual tests and if they measured recovery or did not distinguish between physiological and compensatory movements.

RESULTS: The first search delivered 2546 hits. Of these, 110 articles on 51 upper limb assessment tools were included. The second search resulted in 58 studies on reliability, 11 on measurement error, and 10 on responsiveness. Best evidence synthesis revealed only 2 assessments with moderate positive evidence for reliability, whereas no evidence on measurement error and responsiveness was found. The Melbourne Assessment showed moderate positive evidence for interrater and a fair positive level of evidence for intrarater reliability. The Pediatric Motor Activity Log Revised revealed moderate positive evidence for test-retest reliability.

CONCLUSIONS: There is a lack of high-quality studies about psychometric properties of upper limb measurement tools in children with neuromotor disorders. To date, upper limb rehabilitation trials in children and adolescents risk being biased by insensitive measurement tools lacking reliability.

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DOI: 10.1177/1545968315583723

PMID: 25921350 [PubMed - indexed for MEDLINE]

The relevance of nerve mobility on function and activity in children with Cerebral Palsy.

Marsico P, Tal-Akabi A, van Hedel HJ

BMC Neurol. 2016 Oct 7;16(1):194.

BACKGROUND: In children with cerebral palsy (CP), stiffness, caused by contractile and non-contractile structures, can influence motor performance. This study sought to determine whether the nerve mobility had a relevant impact on motor performance in children with CP. We hypothesized that a positive Straight Leg Raise (SLR) test, as well as smaller SLR hip angle, would relate to lower leg muscle strength, reduced motor capacity and less motor performance in children with CP.

METHODS: We applied a cross-sectional analysis on data including SLR, leg muscle strength, Gross Motor Function Measure (GMFM-66) and number of activity counts during daily life from thirty children with CP (6-18 years). We performed receiver operating characteristics and correlation analyses.

RESULTS: Positive SLR test could distinguish well between children with low versus high muscle strength and GMFM-66 scores. The SLR hip angle correlated significant with the level of disability and with muscle strength. The correlation with the GMFM-66 and the activity counts was fair.

CONCLUSION: This study suggests that neural restriction of SLR is higher on functional and activity outcome than the measured SLR hip range of motion. Further studies should investigate whether improving nerve mobility can lead to an amelioration of function in children with CP.

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DOI: 10.1186/s12883-016-0715-z

PMID: 27717320 [PubMed - in process]

Trunk deformity evaluation based on 3D measurements of front body surface landmarks in people with severe physical disabilities.

Sato H, Kondo M, Ojima I, Fukasawa H, Higuchi S

Dev Neurorehabil. 2016 Aug 12:1-7. [Epub ahead of print]

PURPOSE: To assess reliability and validity of a trunk deformity evaluation method expressed as rotational and lateral lean angles between the upper and the lower trunk and between the lower trunk and the pelvis using 3D positions of six front body surface landmarks.

METHODS: Inter- and intra-rater reliabilities of the proposed method in adults with typical development (n = 22) were assessed, and its validity was also assessed through correlations between the Cobb angle and the analyzed trunk deformity parameters in adults with severe physical disabilities (n = 22).

RESULTS: The mean differences between two raters and between the initial and second measures were within 2°. Moderate correlations were found between the Cobb angle and both the upper and the lower trunk lateral lean angle and the upper trunk rotation angle.

CONCLUSIONS: The proposed trunk deformity evaluation appears to be a reliable and valid approach for bedridden people with physical disabilities.

DOI: 10.1080/17518423.2016.1211188

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Traitement - Rééducation motrice et cognitive

[Palsy of the upper limb: Obstetrical brachial plexus palsy, arthrogryposis, cerebral palsy].

[Article in French]

Salazard B, Philandrianos C, Tekpa B

Ann Chir Plast Esthet. 2016 Oct;61(5):613-621. doi: 10.1016/j.anplas.2016.09.003. Epub 2016 Sep 28.

"Palsy of the upper limb" in children includes various diseases which leads to hypomobility of the member: cerebral palsy, arthrogryposis and obstetrical brachial plexus palsy. These pathologies which differ on brain damage or not, have the same consequences due to the early achievement: negligence, stiffness and deformities. Regular entire clinical examination of the member, an assessment of needs in daily life, knowledge of the social and family environment, are key points for management. In these pathologies, the rehabilitation is an emergency, which began at birth and intensively. Splints and physiotherapy are part of the treatment. Surgery may have a functional goal, hygienic or aesthetic in different situations. The main goals of surgery are to treat: joints stiffness, bones deformities, muscles contractures and spasticity, paresis, ligamentous laxity.

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PMID: 27692236 [PubMed - in process]

Pharmacologie Efficacite Tolérance

Comparison of Efficacy and Side Effects of Oral Baclofen Versus Tizanidine Therapy with Adjuvant Botulinum Toxin Type A in Children With Cerebral Palsy and Spastic Equinus Foot Deformity.

Dai AI, Aksoy SN, Demiryürek AT

J Child Neurol. 2016 Feb;31(2):184-9. doi: 10.1177/0883073815587030. Epub 2015 May 21.

This retrospective study aimed to compare the therapeutic response, including side effects, for oral baclofen versus oral tizanidine therapy with adjuvant botulinum toxin type A in a group of 64 pediatric patients diagnosed with static encephalopathy and spastic equinus foot deformity. Following botulinum toxin A treatment, clinical improvement led to the gradual reduction of baclofen or tizanidine dosing to one-third of the former dose. Gross Motor Functional Measure and Caregiver Health Questionnaire scores were markedly elevated post-botulinum toxin A treatment, with scores for the tizanidine (Gross Motor Functional Measure: 74.45 ± 3.72 ; Caregiver Health Questionnaire : 72.43 ± 4.29) group significantly higher than for the baclofen group (Gross Motor Functional Measure: 68.23 ± 2.66 ; Caregiver Health Questionnaire: 67.53 ± 2.67 , $P < .001$). These findings suggest that the combined use of botulinum toxin A and a low dose of tizanidine in treating children with cerebral palsy appears to be more effective and has fewer side effects versus baclofen with adjuvant botulinum toxin A.

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DOI: 10.1177/0883073815587030

PMID: 25999301 [PubMed - indexed for MEDLINE]

No Decrease in Muscle Strength after Botulinum Neurotoxin-A Injection in Children with Cerebral Palsy.

Eek MN, Himmelmann K

Front Hum Neurosci. 2016 Oct 6;10:506. eCollection 2016.

Spasticity and muscle weakness is common in children with cerebral palsy (CP). Spasticity can be treated with botulinum neurotoxin-A (BoNT-A), but this drug has also been reported to induce muscle weakness. Our purpose was to describe the effect on muscle strength in the lower extremities after BoNT-A injections in children with CP. A secondary aim was to relate the effect of BoNT-A to gait pattern and range of motion. Twenty children with spastic CP were included in the study, 8 girls and 12 boys (mean age 7.7 years). All were able to walk without support, but with increased muscle tone interfering with motor function and gait pattern. Sixteen children had unilateral spastic CP and four bilateral spastic CP. Twenty-four legs received injections with BoNT-A in the plantar flexor muscles. The children were tested before treatment, around 6 weeks after at the peak effect of BoNT-A, and at 6 months after

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treatment, with measurement of muscle strength, gait analysis, and range of motion. There were no differences in muscle strength in plantar flexors of treated legs at peak effect compared to baseline. Six months after treatment, there was still no change in untreated plantar flexor muscles, but an increasing trend in plantar flexor strength in legs treated with BoNT-A. Parents reported positive effects in all children, graded as: small in three children, moderate in eight, and large in nine children. The gait analysis showed a small improvement in knee extension at initial contact, and there was a small increase in passive range of motion for ankle dorsiflexion. Two children had a period with transient weakness and pain. We found that voluntary force production in plantar flexor muscles did not decrease after BoNT-A, instead there was a trend to increased muscle strength at follow-up. The increase may be explained as an effect of the blocking of involuntary nerve impulses, leading to an opportunity to using and training the muscles with voluntary control. Adequate muscle strength is important for maintaining the ability to walk and knowledge of how a treatment affects muscle strength is useful when selecting interventions.

DOI: 10.3389/fnhum.2016.00506

Chirurgie

A cohort study of tibialis anterior tendon shortening in combination with calf muscle lengthening in spastic equinus in cerebral palsy.

Tsang ST, McMorrnan D, Robinson L, Herman J, Robb JE, Gaston MS

Gait Posture. 2016 Oct;50:23-27. doi: 10.1016/j.gaitpost.2016.08.015. Epub 2016 Aug 17.

The aim of this study was to evaluate the outcome of combined tibialis anterior tendon shortening (TATS) and calf muscle-tendon lengthening (CMTL) in spastic equinus. Prospectively collected data was analysed in 26 patients with hemiplegic (n=13) and diplegic (n=13) cerebral palsy (CP) (GMFCS level I or II, 14 males, 12 females, age range 10-35 years; mean 16.8 years). All patients had pre-operative 3D gait analysis and a further analysis at a mean of 17.1 months (± 5.6 months) after surgery. None was lost to follow-up. Twenty-eight combined TATS and CMTL were undertaken and 19 patients had additional synchronous multilevel surgery. At follow-up 79% of patients had improved foot positioning at initial contact, whilst 68% reported improved fitting or reduced requirement of orthotic support. Statistically significant improvements were seen in the Movement Analysis Profile for ankle dorsi-/plantarflexion (4.15° , $p=0.032$), maximum ankle dorsiflexion during swing phase (11.68° , $p<0.001$), and Edinburgh Visual Gait Score (EVGS) (4.85, $p=0.014$). Diplegic patients had a greater improvement in the EVGS than hemiplegics (6.27 -vs- 2.21, $p=0.024$). The originators of combined TATS and CMTL showed that it improved foot positioning during gait. The present study has independently confirmed favourable outcomes in a similar patient population and added additional outcome measures, the EVGS, foot positioning at initial contact, and maximum ankle dorsiflexion during swing phase. Study limitations include short term follow-up in a heterogeneous population and that 19 patients had additional surgery. TATS combined with CMTL is a recommended option for spastic equinus in ambulatory patients with CP.

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PMID: 27559938 [PubMed - in process]

A Systematic Review of the Effects of Single-Event Multilevel Surgery on Gait Parameters in Children with Spastic Cerebral Palsy.

Lamberts RP, Burger M, du Toit J, Langerak NG

PLoS One. 2016 Oct 18;11(10):e0164686. doi: 10.1371/journal.pone.0164686. eCollection 2016.

BACKGROUND: Three-dimensional gait analysis (3DGA) is commonly used to assess the effect of orthopedic single-event multilevel surgery (SEMLS) in children with spastic cerebral palsy (CP).

PURPOSE: The purpose of this systematic review is to provide an overview of different orthopedic SEMLS interventions and their effects on 3DGA parameters in children with spastic CP.

METHODS: A comprehensive literature search within six databases revealed 648 records, from which 89 articles were selected for the full-text review and 24 articles (50 studies) included for systematic review. The Oxford Centre for Evidence-Based Medicine Scale and the Methodological Index for Non-Randomized Studies (MINORS) were used to appraise and determine the quality of the studies.

RESULTS: Except for one level II study, all studies were graded as level III according to the Oxford Centre for Evidence-Based Medicine Scale. The MINORS score for comparative studies (n = 6) was on average 15.7/24, while non-comparative studies (n = 18) scored on average 9.8/16. Nineteen kinematic and temporal-distance gait parameters were selected, and a majority of studies reported improvements after SEMLS interventions. The largest improvements were seen in knee range of motion, knee flexion at initial contact and minimal knee flexion in stance phase, ankle dorsiflexion at initial contact, maximum dorsiflexion in stance and in swing phase, hip rotation and foot progression angles. However, changes in 3DGA parameters varied based on the focus of the SEMLS intervention.

DISCUSSION: The current article provides a novel overview of a variety of SEMLS interventions within different SEMLS focus areas and the post-operative changes in 3DGA parameters. This overview will assist clinicians and researchers as a potential theoretical framework to further improve SEMLS techniques within different SEMLS focus groups. In addition, it can also be used as a tool to enhance communication with parents, although the results of the studies can't be generalised and a holistic approach is needed when considering SEMLS in a child with spastic CP.

DOI: 10.1371/journal.pone.0164686

PMID: 27755599 [PubMed - in process]

Acetabular Remodeling After a Varus Derotational Osteotomy in Children With Cerebral Palsy.

Chang FM Ma J, Pan Z, Ingram JD, Novais EN.

J Pediatr Orthop. 2016 Mar;36(2):198-204. doi: 10.1097/BPO.0000000000000418.

BACKGROUND: The optimal surgical intervention for hip dysplasia in cerebral palsy (CP) is controversial. The purpose of this study was to determine (1) whether an isolated varus derotation osteotomy (VDRO) for the treatment of CP hip dysplasia allows for acetabular remodeling as measured by acetabular depth ratio (ADR), (2) the predictive factors for acetabular remodeling after an isolated VDRO for the treatment of CP hip dysplasia, and (3) to establish the normal ADR in typical children for comparison.

METHODS: Eighty-seven CP patients (174 hips) treated with an isolated VDRO between 2003 and 2009 were retrospectively reviewed. The average age at surgery was 4.6 years (range, 2.4 to 10.6 y) and the average follow-up period was 5.1 years (range, 1.1 to 9.9 y). Acetabular remodeling was assessed on radiographs by the ADR. Changes in preoperative and postoperative ADR were analyzed using linear mixed-effects models. Patients were divided into 2 different groups for the postoperative ADR analysis: Gross Motor Function Classification System (GMFCS) levels I, II, and III compared with GMFCS levels IV and V. The progression of ADR versus age was determined in a set of 917 normal children (1834 hips) for comparison.

RESULTS: There was a statistically significant increase (improvement) in ADR postsurgically for the collective CP set ($P < 0.001$) and for both GMFCS categories (I/II/III, IV/V: $P < 0.001$). GMFCS level, sex, and intraoperative neck shaft angle (NSA) were determined to be significant predictors for postoperative ADR improvement. GMFCS level was the most significant predictor for an increase in ADR after surgery ($P < 0.001$). Less improvement in ADR was observed in patients of GMFCS levels IV and V compared with patients of GMFCS levels I, II, and III ($P < 0.001$). A lower intraoperative NSA resulted in greater postoperative increase in ADR ($P < 0.05$).

CONCLUSIONS: Overall, isolated VDRO allowed for acetabular remodeling in CP hip dysplasia. Acetabular remodeling was increased in patients of GMFCS levels I, II, and III compared with patients of GMFCS levels IV and V. Increased varization at the time of VDRO improved acetabular remodeling. This study recommends considering GMFCS level and intraoperative NSA during surgical planning for CP hip dysplasia.

DOI: 10.1097/BPO.0000000000000418

PMID: 25785594 [PubMed - indexed for MEDLINE]

Is head-shaft angle a valuable continuous risk factor for hip migration in cerebral palsy?

Chougule S, Dabis J, Petrie A, Daly K, Gelfer Y

J Child Orthop. 2016 Oct 12. [Epub ahead of print]

BACKGROUND: Reimer's migration percentage (MP) is the most established radiographic risk factor for hip migration in cerebral palsy (CP), and it assists surgical decision-making. The head-shaft angle (HSA) measures the valgus of the

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head and neck in relation to the shaft and may also be a useful predictor of hip migration at a young age. This study first defined normal values and investigated whether the head-shaft angle (HSA) is a continuous risk factor for hip migration in CP.

METHODS: Three hundred and fifty AP pelvic radiographs of 100 consecutive children comprising the hip surveillance programme in our region were analysed for MP and HSA. Inclusion criteria were children with spastic CP and Gross Motor Function Classification System (GMFCS) levels of III-V, along with a minimum follow-up of 5 years. The mean age was 8.8 (range 3-18) years and the mean follow-up time was 7.5 (range 5-10) years. Radiographs of 103 typically developing children (TDC) were selected for the control group. The reliability of the measurements was determined. A random effects analysis was used to assess the relationship between MP and HSA for all data and for MP > 40 %.

RESULTS: The TDC cohort had a mean HSA of 157.7° whilst that for the CP cohort was 161.7°. The value declined with age in both groups but remained consistently higher in the CP group. A random effects analysis considering the longitudinal data showed that there was no significant effect of HSA on MP. Similarly, when excluding CP patients with MP < 40 %, there was no significant effect of HSA on MP.

CONCLUSIONS: This study found no correlation between HSA and hip migration in children with CP in this age group. Using the HSA as a routine radiographic measure in the management pathway across childhood does not offer any added value. Early enrolment onto the hip surveillance programme could offer a better prediction of hip migration using the HSA at a very young age.

LEVEL OF EVIDENCE: II retrospective prognostic study.

DOI: 10.1007/s11832-016-0774-0

PMID: 27734265 [PubMed - as supplied by publisher]

Long-term changes in femoral anteversion and hip rotation following femoral derotational osteotomy in children with cerebral palsy.

Boyer E, Novacheck TF, Rozumalski A, Schwartz MH

Gait Posture. 2016 Oct;50:223-228. doi: 10.1016/j.gaitpost.2016.09.004. Epub 2016 Sep 8.

BACKGROUND: Excessive femoral anteversion is common in cerebral palsy (CP), is often associated with internal hip rotation during gait, and is frequently treated with a femoral derotational osteotomy (FDO). Concerns exist regarding long-term maintenance of surgical outcomes. Past studies report varying rates of recurrence, but none have employed a control group.

METHODS: We conducted a retrospective analysis examining long-term (~5 years) changes in anteversion and hip rotation following FDO in children with CP. We included a control group that was matched for age and exhibited excessive anteversion (>30°) but did not undergo an FDO. Anteversion, mean stance hip rotation, and rates of problematic remodeling and recurrence were assessed (>15° change and final level outside of normal limits).

RESULTS: The control group was reasonably well matched, but exhibited 9° less anteversion and 3° less internal hip rotation at the pre time point. At a five year follow-up, the FDO group had less anteversion than the control group (20° vs. 35°, p<0.05). The mean stance phase hip rotation did not differ between the groups (4° vs. 5°, p=0.17). Over one third of limbs remained excessively internal in both groups (FDO: 34%, Control: 37%). Rates of problematic recurrence and remodeling were low (0%-11%).

CONCLUSIONS: An FDO is an effective way to correct anteversion in children with CP. Long-term hip rotation is not fully corrected by the procedure, and is not superior to a reasonably well matched control group. Rates of problematic recurrence and remodeling are low, and do not differ between the groups.

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DOI: 10.1016/j.gaitpost.2016.09.004

PMID: 27653149 [PubMed - in process]

Major perioperative complications after spine surgery in patients with cerebral palsy: assessment of risk factors.

Samdani AF, Belin EJ, Bennett JT, Miyajima F, Pahys JM, Shah SA, Newton PO, Betz RR, Cahill PJ, Sponseller PD

Eur Spine J. 2016 Mar;25(3):795-800. doi: 10.1007/s00586-015-4054-3. Epub 2015 Jul 7.

PURPOSE: A prospective, longitudinal cohort was studied to determine the incidence, consequences, and risk factors of major perioperative complications in patients with cerebral palsy (CP) treated with spinal fusion. There is a wide variety of data available on the complications of spine surgery; however, little exists on the perioperative complications in patients with CP.

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METHODS: A prospective multicenter dataset of consecutive patients with CP treated with spinal fusion was evaluated. All major perioperative complications were identified and stratified into categories: pulmonary, gastrointestinal, other medical, wound infection, neurological, instrumentation related, and unplanned staged surgery. Univariate and multivariate analyses were performed to identify various risk factors for major perioperative complications.

RESULTS: 127 patients were identified with a mean age of 14.3 ± 2.6 years. Overall, 39.4% of the patients had a major perioperative complication. Occurrence of a complication [no complication (NC), yes complication (YC)] resulted in significantly increased intensive care unit (ICU) (NC = 3.2 days, YC = 7.8 days, $p < 0.05$) and hospital stays (NC = 7.7 days, YC = 15.6 days, $p < 0.05$). Variables associated with greater risk of a complication included: increased estimated blood loss (EBL) ($p < 0.001$), larger preoperative kyphosis ($p = 0.05$), staged procedures ($p < 0.05$), a lack of antifibrinolytic use ($p < 0.05$), and a trend toward lower body mass index (BMI) ($p = 0.08$). Multivariate regression analysis revealed an increased EBL as independently associated with a major perioperative complication ($p < 0.05$).

CONCLUSIONS: In this cohort of patients with CP who underwent spinal fusion, 39.4% experienced a major perioperative complication, with pulmonary being the most common. The occurrence of a major perioperative complication lengthened both ICU and hospital stay. Risk factors for major perioperative complications included greater preoperative kyphosis, staged procedures, a lack of antifibrinolytic use, and increased EBL, with the latter being an independent predictor of a major perioperative complication.

LEVEL OF EVIDENCE: 2.

DOI: 10.1007/s00586-015-4054-3

PMID: 26148567 [PubMed - indexed for MEDLINE]

Proximal femur prosthetic interposition arthroplasty for painful dislocated hips in children with cerebral palsy.

Silverio AL, Nguyen SV, Schlechter JA, Rosenfeld SR

J Child Orthop. 2016 Oct 27. [Epub ahead of print]

PURPOSE: Children with cerebral palsy often have musculoskeletal disorders involving the hip. There are several procedures that are commonly used to treat these disorders. Proximal femur prosthetic interposition arthroplasty (PFIA) is an option for non-ambulatory children with cerebral palsy who have a painful, spastic dislocated hip. The purpose of our study was to evaluate the results of PFIA by examining treatment outcomes, complications, and overall effects on the child and their caregiver.

METHODS: Charts were reviewed over a 5-year period at our institution. The focus of the data collection was pain, range of motion (ROM), and overall clinical outcome. Clinical outcome was graded as excellent, good, fair, and poor. Length of follow-up, presence of heterotopic ossification, femoral prosthesis migration, and information provided by completed caregiver questionnaires were analyzed.

RESULTS: A total of 16 hips in 12 patients met the inclusion criteria. Average age at time of surgery was 12 years 1.2 months. Average follow-up was 40.4 months. Three hips required revision surgery. Average time before revision surgery was 16 months. Overall outcomes were excellent/good for seven hips and fair/poor for nine. Pain outcomes were excellent/good for nine hips and fair/good for seven. ROM outcomes were excellent/good for nine hips and fair/poor for seven. The majority of caregivers surveyed would recommend this procedure.

CONCLUSION: Clinical evaluation of the effectiveness of PFIA yielded variable results with this cohort of children with regards to pain and range of motion. Despite these varied results, the majority of caregivers were satisfied with the outcome and would recommend PFIA. PFIA is a salvage option for the painful, spastic dislocated hip, but significant evidence to prove its effectiveness over other salvage procedures is lacking. Based on our results, we conclude that PFIA has the ability to benefit children with cerebral palsy with an acceptable risk profile similar to that reported in recent publications. Level of evidence IV; retrospective case-series.

DOI: 10.1007/s11832-016-0775-z

PMID: 27787761 [PubMed - as supplied by publisher]

Rigid Instrumentation for Neuromuscular Scoliosis Improves Deformity Correction Without Increasing Complications.

Funk S, Lovejoy S, Mencio G, Martus J.

Spine (Phila Pa 1976). 2016 Jan;41(1):46-52. doi: 10.1097/BRS.0000000000001170.

STUDY DESIGN: Retrospective chart and radiographic review.

OBJECTIVE: To evaluate spinopelvic fixation technical advancements for the treatment of neuromuscular scoliosis.

SUMMARY OF BACKGROUND DATA: Implants for vertebral and pelvic fixation have evolved without data demonstrating the benefit for neuromuscular scoliosis. The aim of this study was to evaluate this evolution in terms of deformity correction, complications, and implant cost.

METHODS: Patients treated with posterior spinal fusion to the pelvis for neuromuscular scoliosis with minimum 1-year follow-up from 1998 to 2012 were reviewed. Constructs were defined as nonrigid (>50% sublaminar wire fixation with Galveston or iliac screw pelvic fixation) and rigid (≥50% pedicle screw fixation with iliac or sacral alar iliac screw pelvic fixation).

RESULTS: Eighty patients were identified: cerebral palsy (55%), myelomeningocele (16%), syndrome (8%), muscular dystrophy (15%), or other neuromuscular disorders (6%). A total of 95% were nonambulatory. Mean follow-up was 3.9 years (range 1-12 years). Construct types were 23 nonrigid and 57 rigid. Estimated construct cost was greater in the rigid group at \$15,488 as compared with \$3128 in the nonrigid group despite the lower anchor density in the rigid construct group (1.38 vs. 1.80, $P < 0.001$). Open anterior releases were more frequently performed in the nonrigid group (13/23 vs. 5/57, $P < 0.001$). Deformity correction at final follow-up was significantly greater for both Cobb angle and pelvic obliquity in the rigid group. The rates of wound infection, wound dehiscence, implant prominence, and mechanical failure of the fixation were not significantly different. The pseudarthrosis rate requiring revision surgery was 22% in nonrigid group and 5% in the rigid group ($P = 0.026$).

CONCLUSION: Advances in spinopelvic fixation have resulted in improved deformity correction with lower rates of pseudarthrosis and a decreased need for anterior release. This study demonstrates the benefits of modern spinopelvic fixation techniques.

DOI: 10.1097/BRS.0000000000001170

PMID: 26352742 [PubMed - indexed for MEDLINE]

Single-level selective dorsal rhizotomy for spastic cerebral palsy.

Graham D, Aquilina K, Cawker S, Paget S, Wimalasundera N

J Spine Surg. 2016 Sep;2(3):195-201.

The management of cerebral palsy (CP) is complex and requires a multidisciplinary approach. Selective dorsal rhizotomy (SDR) is a neurosurgical technique that aims to reduce spasticity in the lower limbs. A minimally invasive approach to SDR involves a single level laminectomy at the conus and utilises intraoperative electromyography (EMG). When combined with physiotherapy, SDR is effective in selected children and has minimal complications. This review discusses the epidemiology of CP and the management using SDR within an integrated multidisciplinary centre. Particular attention is given to the single-level laminectomy technique of SDR and its rationale, and the patient workup, recovery and outcomes of SDR.

DOI: 10.21037/jss.2016.08.08

PMID: 27757432 [PubMed - in process]

The Frequency of AVN Following Reconstructive Hip Surgery in Children With Cerebral Palsy: A Systematic Review.

Hesketh K, Leveille L, Mulpuri K.

J Pediatr Orthop. 2016 Mar;36(2):e17-24. doi: 10.1097/BPO.0000000000000485.

BACKGROUND: Children with cerebral palsy (CP) undergoing reconstructive hip surgery are at risk for developing avascular necrosis (AVN). The purpose of this systematic review was to investigate the reported frequency of AVN, the amount and quality of literature available, and possibly identify risk factors for developing AVN following reconstructive surgery for hip displacement in children with CP.

METHODS: We performed a review of the literature using EMBASE and MEDLINE databases. Studies investigating the outcome of reconstructive hip surgery in patients with CP that identified the presence or absence of AVN were included. Study quality was assessed using the Methodological Index for Non-Randomized Studies and the Oxford Centre for Evidence-Based Medicine scale.

RESULTS: Three hundred and ninety-nine articles were identified using our search strategy. Twenty-nine studies were included for data extraction after full-text review. The frequency of AVN ranged from 0% to 46% with an overall rate across studies of 7.5%. Presence of AVN was the primary outcome in 2 studies. The frequency of AVN in these studies was significantly higher than other studies at 37% and 46%. No statistically significant associations were

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found between age at surgery, severity of hip subluxation, length of follow-up, or type of surgery (combined varus derotation osteotomy and pelvic osteotomy vs. varus derotation osteotomy alone), and the rate of AVN. The majority of studies did not comment on methods used for determining diagnosis or severity of AVN and clinical significance was not well documented.

CONCLUSIONS: Children with CP undergoing reconstructive hip surgery are at risk of developing AVN. Frequency and severity of this complication is poorly documented in the literature. On the basis of current evidence no significant risk factors were identified; however, it is not possible to draw firm conclusions about them. Incidence of AVN was higher in studies in which AVN was a primary outcome suggesting that the true frequency of AVN may be higher than is currently understood.

DOI: 10.1097/BPO.0000000000000485

PMID: 26849636 [PubMed - indexed for MEDLINE]

The influence of timing of knee recurvatum on surgical outcome in cerebral palsy.

Klotz MC, Heitzmann DW, Wolf SI, Niklasch M, Maier MW, Dreher T

Res Dev Disabil. 2016 Jan;48:186-92. doi: 10.1016/j.ridd.2015.09.017. Epub 2015 Nov 19.

Recent reports have shown that timing of genu recurvatum (GR) might be caused by different underlying factors and that equinus leads to GR especially during early stance. The purpose of this study was to investigate the reduction of GR after surgical correction of equinus in children with bilateral spastic cerebral palsy and whether the children with early and late type GR show differences in reduction of knee hyperextension after a surgery. In 24 limbs (mean age 10.3 years, GMFCS I-III) showing equinus and GR the kinematics of the knee and ankle as well as the kinetics of the knee were evaluated before and one year (mean follow up period: 12.8 months) after surgical correction of equinus. The study was approved by the local ethical committee. Limbs with early type GR showed a reduction by 11.1° ($p < 0.001$) and those with late type GR by 6.0° ($p < 0.049$) in GR after surgery. Before surgery limbs with early type GR showed increased external extending moments, which decreased significantly after surgery. In contrast limbs with late GR did not show a significant reduction of those moments. The findings of this study underline the influence of equinus on early GR as an underlying factor. As equinus is attributed to early knee hyperextension and proximal factors are more important as underlying factors in late type GR, a classification into early and late onset GR is useful to identify underlying factors and to choose adequate treatment.

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DOI: 10.1016/j.ridd.2015.09.017

PMID: 26599296 [PubMed - indexed for MEDLINE]

Tibial Rotation Osteotomies in a Matched Cohort of Myelodysplasia and Cerebral Palsy Children.

Stasikelis PJ, Creek AT, Wack LI.

J Pediatr Orthop. 2016 Oct 21. [Epub ahead of print]

BACKGROUND: The purpose of this study is to examine the frequency of complications in children with myelodysplasia (MD) undergoing tibial rotational osteotomies with a matched cohort of children with cerebral palsy (CP). It was postulated that because of the unique health issues facing children with MD more complications would be observed.

METHODS: A retrospective chart review was performed to identify children with MD who underwent primary tibial rotational osteotomy between 1997 and 2012 and had a minimum 2-year follow-up. The 15 children thus identified were matched for age, body mass index, and functional ability with 15 children with CP. Outcome measures were complications that occurred within a year of osteotomy or hardware removal. Major complications were defined as nonunions or malunions, hardware failures, deep infections, fractures, and stage III or IV decubiti. Recurrence of rotational deformity requiring revision osteotomy at any time was also defined as a major complication. Minor wound problems healing within 6 weeks with only local care were considered minor complications.

RESULTS: Fifteen children with MD, who underwent 21 tibial derotational osteotomies, were available for review with a mean 7-year follow-up. The 15 children with CP underwent 22 tibial derotational osteotomies with a mean of 6 years of follow-up. In each cohort there were 3 children classified as GMFCS I, 3 children as GMFCS II, 4 children as GMFCS III, and 5 as GMFCS IV. Three (20%) of the children with MD experienced major complications (1 infected nonunion and 2 children who experienced bilateral malunions requiring revisions). One child with a major

complication was classified as GMFCS II and the other 2 as GMFCS IV. None of the children with CP experienced a major complication.

CONCLUSIONS: The majority of children in both groups experienced good results, but children with MD have more frequent major complications. More frequent complications were seen in children with less functional ability.

LEVEL OF EVIDENCE: Level III-prognostic study, case-control study.

DOI: 10.1097/BPO.0000000000000888

PMID: 27776050 [PubMed - as supplied by publisher]

Total hip replacement in young non-ambulatory cerebral palsy patients.

Morin C, Ursu C, Delecourt C

Orthop Traumatol Surg Res. 2016 Sep 30. pii: S1877-0568(16)30127-X. doi: 10.1016/j.otsr.2016.07.010. [Epub ahead of print]

INTRODUCTION: The everyday life of a non-ambulatory adolescent or young adult with cerebral palsy can be severely impaired by a painful or stiff hip. The usual surgical solutions such as proximal femoral resection (PFR) are not entirely satisfactory for pain relief, and are mutilating.

HYPOTHESIS: A retrospective study assessed the impact of total hip replacement (THR) on such impairment, on the hypothesis that it is more effective than PFR in relieving pain, without aggravating disability.

PATIENTS AND METHODS: The surgical technique consisted in implanting a dual-mobility prosthesis with uncemented acetabular component and cemented femur, after upper femoral shaft shortening and short hip-spica cast immobilization. Forty THRs were performed in 33 patients, including 31 with multiple disability. Follow-up assessment focused on change in functional status, pain, and range of motion.

RESULTS: Mean follow-up was 5 years. Pain was more or less entirely resolved. Improvement in range of motion was less striking, and there was no significant change in functional status. There were 2 general, 2 septic and 10 mechanical complications, 6 of which required surgical revision.

DISCUSSION: In non-ambulatory cerebral palsy, THR provided much better alleviation of pain than found with PFR treatment. It should be reserved for patients able to withstand fairly long surgery and with femur size compatible with implantation of a femoral component, however small.

LEVEL OF EVIDENCE: IV, retrospective study.

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DOI: 10.1016/j.otsr.2016.07.010

PMID: 27697405 [PubMed - as supplied by publisher]

Réadaptation fonctionnelle

An evaluator-blinded randomized controlled trial evaluating therapy effects and prognostic factors for a general and an individually defined physical therapy program in ambulant children with bilateral spastic cerebral palsy.

Franki I, Desloovere K, De Cat J, Tjihuis W, Molenaers G, Feys H, Vanderstraeten G, Van Den Broeck C.

Eur J Phys Rehabil Med. 2015 Dec;51(6):677-91. Epub 2015 Jul 27.

BACKGROUND: Cerebral palsy (CP) is characterized by a heterogeneous nature with a variety of problems. Therefore, individualized physical therapy might be more appropriate to address the needs for these children.

AIM: The first aim was to compare the effectiveness of an individually-defined therapy program (IT) and a general therapy program (GT) on gait and gross motor function in children with CP. The second aim was to evaluate interaction-effects, time-effects, treatment with botulinum toxin A, age, gross Motor Function Classification Scale (GMFCS), treatment frequency and quality as factors influencing outcome.

DESIGN: An evaluator-blinded, randomized controlled trial.

SETTING: Outpatient rehabilitation unit.

POPULATION: Forty ambulant children with spastic bilateral CP (mean age 6 years 1 month).

METHODS: All children were randomly assigned to receive either IT or GT over a 10 week period. Nineteen of these children were enrolled into a second and/or third program, resulting in 60 interventions. Primary outcome was assessed with the Goal Attainment Scale (GAS) for gross motor function goals and z-scores for goals based on specific 3D gait parameters. Secondary outcome included the Gross Motor Function Measure-88 (GMFM-88) scores,

time and distance gait parameters, Gait Profile Score, Movement Analysis Profiles and time needed to complete Timed-Up-and-Go and Five-Times-Sit-To-Stand tests.

RESULTS: There were higher, but non-significant GAS and z-score changes following the IT program compared to the GT program (GAS: 46.2 for the IT versus 42.2 for the GT group, $P=0.332$, ES 0.15; z-score: 0.135 for the IT compared to 0.072 for the GT group, $P=0.669$, ES 0.05). Significant time-effects could be found on the GAS ($P<0.001$) and the GMFM-88 total score ($P<0.001$). Age was identified as a predictor for GAS and GMFM-88 improvement ($P=0.023$ and $P=0.044$).

CONCLUSION: No significant differences could be registered between the effects of the IT and the GT. The favorable outcome after the IT program was only a trend and needs to be confirmed on larger groups and with programs of longer duration.

CLINICAL REHABILITATION IMPACT: Both programs had a positive impact on the children's motor functioning. It is useful to involve older children more actively in the process of goal setting.

[Free Article](#)

PMID: 26220326 [PubMed - indexed for MEDLINE]

Astym Therapy Improves Bilateral Hamstring Flexibility and Achilles Tendinopathy in a Child with Cerebral Palsy: A Retrospective Case Report.

Scheer NA, Alstat LR, Van Zant RS

Clin Med Insights Case Rep. 2016 Oct 20;9:95-98. eCollection 2016.

PURPOSE: The purpose of this case report was to describe the use of Astym therapy to improve hamstring flexibility and Achilles tendinopathy in a child with cerebral palsy.

CASE DESCRIPTION: An eight-year-old female with cerebral palsy was referred to physical therapy for the treatment of bilateral hamstring inflexibility and Achilles tendinopathy. Treatment focused on an Astym therapy protocol of eccentric exercise, stretching, active and passive range of motion, gait training, and a home exercise program. The patient underwent a total of 11 physical therapy treatment sessions.

OUTCOMES: At the conclusion of treatment, the patient demonstrated improved resting muscle tone in bilateral lower extremities with active 90/90 hamstring flexibility measured at 165° and ankle dorsiflexion active range of motion of 5° without pain at 0° and 90° knee flexion. The patient exhibited an improved gait pattern with even stride length and diminished genu recurvatum, decreased pain with standing and walking, discontinued use of ankle-foot orthoses, and improved activity tolerance and overall function for daily activities.

DISCUSSION: The results of this case report indicate that physical therapy rehabilitation utilizing an Astym therapy protocol can successfully achieve gains in flexibility and strength and allow for improved function of bilateral lower extremities in a patient with cerebral palsy.

CONCLUSION: Based on the findings of this case report, clinicians should consider the use of Astym therapy in treating musculoskeletal soft tissue dysfunction in pediatric patients with cerebral palsy.

DOI: 10.4137/CCRep.S40623

PMID: 27790051 [PubMed - in process]

Do we really know what they were testing? Incomplete reporting of interventions in randomised trials of upper limb therapies in unilateral cerebral palsy.

Sakzewski L, Reedman S, Hoffmann T

Res Dev Disabil. 2016 Oct 10;59:417-427. doi: 10.1016/j.ridd.2016.09.018. [Epub ahead of print]

BACKGROUND: Incomplete reporting of components of interventions limits uptake of evidence into clinical practice.

AIMS: To evaluate the completeness of reporting of research and control interventions in randomised trials of upper limb therapies for children with unilateral cerebral palsy.

METHODS AND PROCEDURES: Sixty randomized trials were included, encompassing 60 research and 68 control interventions. Using the 12-item Template for Intervention Description and Replication (TIDieR) checklist, two reviewers independently rated intervention and control descriptions.

OUTCOMES AND RESULTS: When using 50% of studies as the benchmark, five of the 12 TIDieR items for the research intervention, eight of the 12 items for the control intervention and 11 of 12 items for "usual care" interventions were inadequately reported. Procedures used to deliver the research intervention were adequately reported for 63% of studies. Materials were used in 94% of research interventions, yet only 27% provided details to

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access/replicate materials. Training materials for interventionists were used in 38% of trials, 10 (17%) had procedure manuals, yet only 3 reported details to access materials. The location where the research intervention was provided was detailed in 65% of studies. Reporting of all items was poorer for the control intervention.

CONCLUSIONS: No study adequately reported all elements on the TIDieR checklist. Details crucial for replication of interventions and interpretation of results were missing. Authors, reviewers, and editors all have a responsibility to improve the quality of intervention reporting in published trials. The TIDieR guide is a potential solution, helping to structure accounts of interventions.

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PMID: 27736712 [PubMed - as supplied by publisher]

Executive functions in preschool children with cerebral palsy--Assessment and early intervention--A pilot study.

Sørensen K, Liverød JR, Lerdal B, Vestrheim IE, Skranes J

Dev Neurorehabil. 2016;19(2):111-6. doi: 10.3109/17518423.2014.916761. Epub 2014 May 19.

OBJECTIVE: To assess the level of executive functioning among preschool children with cerebral palsy (CP) and evaluate effects of the Program Intensified habilitation (PIH).

METHODS: In this non-randomized, prospective study, 15 preschool children with CP, and their parents attended the PIH for a 1-year period. Executive functions were evaluated using the Behavior Rating Inventory of Executive functions-Preschool version (BRIEF-P), filled out by parents and preschool teachers.

RESULTS: Before PIH, scores of executive function difficulties were close to the general population mean. After PIH, fathers and preschool teachers reported reduced levels of executive difficulties on, respectively, the Emergent Metacognition Index and the Flexibility Index on the BRIEF-P. Mothers reported no changes.

CONCLUSION: The children in our sample showed age-appropriate levels of executive functions before attending PIH. Some aspects of executive skills difficulties were reduced after PIH. Using BRIEF-P contributed to the differentiation of cognitive strengths and weaknesses among the children.

DOI: 10.3109/17518423.2014.916761

PMID: 24840746 [PubMed - indexed for MEDLINE]

Neuroplastic Sensorimotor Resting State Network Reorganization in Children With Hemiplegic Cerebral Palsy Treated With Constraint-Induced Movement Therapy.

Manning KY(1), Menon RS(2), Gorter JW(3), Mesterman R(3), Campbell C(4), Switzer L(5), Fehlings D

J Child Neurol. 2016 Feb;31(2):220-6. doi: 10.1177/0883073815588995. Epub 2015 Jun 15.

Using resting state functional magnetic resonance imaging (MRI), we aim to understand the neurologic basis of improved function in children with hemiplegic cerebral palsy treated with constraint-induced movement therapy. Eleven children including 4 untreated comparison subjects diagnosed with hemiplegic cerebral palsy were recruited from 3 clinical centers. MRI and clinical data were gathered at baseline and 1 month for both groups, and 6 months later for the case group only. After constraint therapy, the sensorimotor resting state network became more bilateral, with balanced contributions from each hemisphere, which was sustained 6 months later. Sensorimotor resting state network reorganization after therapy was correlated with a change in the Quality of Upper Extremity Skills Test score at 1 month ($r = 0.79$, $P = .06$), and Canadian Occupational Performance Measure scores at 6 months ($r = 0.82$, $P = .05$). This clinically correlated resting state network reorganization provides further evidence of the neuroplastic mechanisms underlying constraint-induced movement therapy.

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DOI: 10.1177/0883073815588995

PMID: 26078420 [PubMed - indexed for MEDLINE]

Pilot study of a targeted dance class for physical rehabilitation in children with cerebral palsy.

López-Ortiz C, Egan T, Gaebler-Spira DJ

SAGE Open Med. 2016 Sep 23;4:2050312116670926. eCollection 2016.

INTRODUCTION: This pilot study evaluates the effects of a targeted dance class utilizing classical ballet principles for rehabilitation of children with cerebral palsy on balance and upper extremity control.

Science Infos Paralysie Cérébrale, Septembre 2016, FONDATION PARALYSIE CEREBRALE 67 rue Vergniaud 75013 Paris - tel +33 1 45 54 03 03 contact: Christine Doumergue
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METHODS: Twelve children with cerebral palsy (ages 7-15 years) with Gross Motor Function Classification scores II-IV participated in this study and were assigned to either a control group or targeted dance class group. Targeted dance class group participated in 1-h classes three times per week in a 4-week period. The Pediatric Balance Scale and the Quality of Upper Extremity Skills Test were administered before, after, and 1 month after the targeted dance class.

RESULTS: Improvements in the Pediatric Balance Scale were present in the targeted dance class group in before versus after and before versus 1 month follow-up comparisons (p-value = 0.0088 and p-value = 0.019, respectively). The Pediatric Balance Scale changes were not significant in the control group. The Quality of Upper Extremity Skills Test did not reach statistical differences in either group.

CONCLUSION: Classical ballet as an art form involves physical training, musical accompaniment, social interactions, and emotional expression that could serve as adjunct to traditional physical therapy. This pilot study demonstrated improvements in balance control. A larger study with a more homogeneous sample is warranted.

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DOI: 10.1177/2050312116670926

PMID: 27721977 [PubMed - in process]

Strength Training for Adolescents with cerebral palsy (STAR): study protocol of a randomised controlled trial to determine the feasibility, acceptability and efficacy of resistance training for adolescents with cerebral palsy.

Ryan JM, Theis N, Kilbride C, Baltzopoulos V, Waugh C, Shortland A, Lavelle G, Noorkoiv M, Levin W, Korff T
BMJ Open. 2016 Oct 4;6(10):e012839. doi: 10.1136/bmjopen-2016-012839.

INTRODUCTION: Gait is inefficient in children with cerebral palsy, particularly as they transition to adolescence. Gait inefficiency may be associated with declines in gross motor function and participation among adolescents with cerebral palsy. Resistance training may improve gait efficiency through a number of biomechanical and neural mechanisms. The aim of the Strength Training for Adolescents with cerebral palsy (STAR) trial is to evaluate the effect of resistance training on gait efficiency, activity and participation in adolescents with cerebral palsy. We also aim to determine the biomechanical and neural adaptations that occur following resistance training and evaluate the feasibility and acceptability of such an intervention for adolescents with cerebral palsy.

METHODS AND ANALYSIS: 60 adolescents (Gross Motor Function Classification System level I-III) will be randomised to a 10-week resistance training group or a usual care control group according to a computer-generated random schedule. The primary outcome is gait efficiency. Secondary outcomes are habitual physical activity, participation, muscle-tendon mechanics and gross motor function. General linear models will be used to evaluate differences in continuous data between the resistance training and usual care groups at 10 and 22 weeks, respectively. A process evaluation will be conducted alongside the intervention. Fidelity of the resistance training programme to trial protocol will be quantified by observations of exercise sessions. Semistructured interviews will be conducted with participants and physiotherapists following the resistance training programme to determine feasibility and acceptability of the programme.

ETHICS AND DISSEMINATION: This trial has ethical approval from Brunel University London's Department of Clinical Sciences' Research Ethics Committee and the National Research Ethics Service (NRES) Committee London-Surrey Borders. The results of the trial will be submitted for publication in academic journals, presented at conferences and distributed to adolescents, families and healthcare professionals through the media with the assistance of the STAR advisory group.

TRIAL REGISTRATION NUMBER: ISRCTN90378161; Pre-results.

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PMID: 27707836 [PubMed - in process]

The Effect of Biomechanical Constraints on Neural Control of Head Stability in Children With Moderate-to-Severe Cerebral Palsy.

da Costa CS, Saavedra SL, Rocha NA, Woollacott MH
Phys Ther. 2016 Oct 6. [Epub ahead of print]

BACKGROUND: External support has been viewed as an important biomechanical constraint for children with deficits in postural control. Nonlinear analysis of head stability is necessary to confirm benefits of interaction between external trunk support and level of trunk control.

OBJECTIVE: To compare the effect of biomechanical constraints (trunk support) on neural control of head stability during development of trunk control.

DESIGN: Quasi-experimental repeated measure study.

METHODS: Fifteen children (4-16 years) with moderate (Gross Motor Function Classification System (GMFCS) IV; n=8; 4 males) or severe (GMFCS V; n=7; 4 males) CP were compared to previous longitudinal data from TD infants (3-9 months of age). Kinematic data were used to document head sway with external support at four levels (axillae, mid-rib, waist, and hip). Complexity, predictability and active degrees of freedom (DOF) for both AP and ML directions were assessed.

RESULTS: Irrespective of level of support, CP groups had lower complexity, increased predictability and greater DOF ($p < 0.001$). The effect of support differed based on the child's segmental level of control. GMFCS V and youngest TD groups demonstrated better head control with increased complexity and decreased predictability with higher levels of support. GMFCS IV group had the opposite effect, showing decreased predictability, increased complexity and DOF with lower levels of support.

CONCLUSIONS: The effect of external support varies depending on the child's level of control and diagnostic status. Children with GMFCS V and young TD infants had better outcomes with external support, but external support was not enough to completely correct for influence of CP. Children with GMFCS IV performed worse with support at axillae or midribs suggesting that too much support can interfere with postural sway quality.

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PMID: 27758963 [PubMed - as supplied by publisher]

The effects of intensive bimanual training with and without tactile training on tactile function in children with unilateral spastic cerebral palsy: A pilot study.

Kuo HC, Gordon AM, Henrionnet A, Hautfenne S, Friel KM, Bleyenheuft Y

Res Dev Disabil. 2016 Feb-Mar;49-50:129-39. doi: 10.1016/j.ridd.2015.11.024. Epub 2015 Dec 14.

Children with unilateral spastic cerebral palsy (USCP) often have tactile impairments. Intensive bimanual training improves the motor abilities, but the effects on the sensory system have not been studied. Here we compare the effects of bimanual training with and without tactile training on tactile impairments. Twenty children with USCP (6-15.5 years; MACS: I-III) were randomized to receive either bimanual therapy (HABIT) or HABIT+tactile training (HABIT+T). All participants received 82 h of standardized HABIT. In addition 8 sessions of 1h were provided to both groups. The HABIT+T group received tactile training (without vision) using materials of varied shapes and textures. The HABIT group received training with the same materials without tactile directed training (full vision). Primary outcomes included grating orientation task/GOT and stereognosis. Secondary outcomes included two-point discrimination/TPD, Semmes-Weinstein monofilaments/SWM. The GOT improved in both groups after training, while stereognosis of the more-affected hand tended to improve (but $p = 0.063$). No changes were found in the TPD and the SWM. There were no group×test interactions for any measure. We conclude tactile spatial resolution can improve after bimanual training. Either intensive bimanual training alone or incorporation of materials with a diversity of shapes/textures may drive these changes.

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PMCID: PMC4871715

PMID: 26698408 [PubMed - indexed for MEDLINE]

The effects of progressive resistance training on daily physical activity in young people with cerebral palsy: a randomised controlled trial.

Bania TA, Dodd KJ, Baker RJ, Graham HK, Taylor NF

Disabil Rehabil. 2016;38(7):620-6. doi: 10.3109/09638288.2015.1055376. Epub 2015 Jun 9.

PURPOSE: To examine if individualised resistance training increases the daily physical activity of adolescents and young adults with bilateral spastic cerebral palsy (CP).

METHOD: Young people with bilateral spastic CP were randomly assigned to intervention or to usual care. The intervention group completed an individualised lower limb progressive resistance training programme twice a week for 12 weeks in community gymnasiums. The primary outcome was daily physical activity (number of steps, and time sitting and lying). Secondary outcomes included muscle strength measured with a one-repetition maximum (1RM) leg press and reverse leg press. Outcomes were measured at baseline, 12 weeks and 24 weeks.

RESULTS: From the 36 participants with complete data at 12 weeks, there were no between-group differences for any measure of daily physical activity. There was a likely increase in leg press strength in favour of the intervention group (mean difference 11.8 kg; 95% CI -1.4 to 25.0). No significant adverse events occurred during training.

CONCLUSIONS: A short-term resistance training programme that may increase leg muscle strength was not effective in increasing daily physical activity. Other strategies are needed to address the low-daily physical activity levels of young people with bilateral spastic CP.

IMPLICATIONS FOR REHABILITATION: Progressive resistance training may increase muscle strength but does not lead to increases in daily physical activity of young people with bilateral spastic cerebral palsy (CP) and mild to moderate walking disabilities. Other strategies apart from or in addition to resistance training are needed to address the low daily physical activity levels of young people with bilateral spastic CP and mild to moderate walking disabilities.

DOI: 10.3109/09638288.2015.1055376

PMID: 26056856 [PubMed - indexed for MEDLINE]

The Influence of a Constraint and Bimanual Training Program Using a Variety of Modalities, on Upper Extremity Functions and Gait Parameters Among Children with Hemiparetic Cerebral Palsy: A Case Series.

Cohen-Holzer M, Sorek G, Schless S, Kerem J, Katz-Leurer M

Phys Occup Ther Pediatr. 2016;36(1):17-27. doi: 10.3109/01942638.2014.990549. Epub 2014 Dec 18.

AIM: To assess the influence of an intensive combined constraint and bimanual upper extremity (UE) training program using a variety of modalities including the fitness room and pool, on UE functions as well as the effects of the program on gait parameters among children with hemiparetic cerebral palsy.

METHODS: Ten children ages 6-10 years participated in the program for 2 weeks, 5 days per week for 6 hr each day. Data from the Assisting Hand Assessment (AHA) for bimanual function, the Jebsen-Taylor Test of Hand Function (JTTHF) for unimanual function, the six-minute walk test (6MWT), and the temporal-spatial aspects of gait using the GAITRite walkway were collected prior to, immediately post and 3-months post-intervention.

RESULTS: A significant improvement was noted in both unimanual as well as bimanual UE performance; A significant improvement in the 6MWT was noted, from a median of 442 meter [range: 294-558] at baseline to 466 [432-592] post intervention and 528 [425-609] after 3 months ($p = .03$).

CONCLUSION: Combining intensive practice in a variety of modalities, although targeting to the UE is associated with substantial improvement both in the upper as well as in the lower extremity function.

DOI: 10.3109/01942638.2014.990549

PMID: 25521486 [PubMed - indexed for MEDLINE]

Robots – Exoskeleton

Feasibility and reliability of using an exoskeleton to emulate muscle contractures during walking.

Attias M, Bonnefoy-Mazure A, De Coulon G, Cheze L, Armand S

Gait Posture. 2016 Oct;50:239-245. doi: 10.1016/j.gaitpost.2016.09.016. Epub 2016 Sep 19.

Contracture is a permanent shortening of the muscle-tendon-ligament complex that limits joint mobility. Contracture is involved in many diseases (cerebral palsy, stroke, etc.) and can impair walking and other activities of daily living. The purpose of this study was to quantify the reliability of an exoskeleton designed to emulate lower limb muscle contractures unilaterally and bilaterally during walking. An exoskeleton was built according to the following design criteria: adjustable to different morphologies; respect of the principal lines of muscular actions; placement of reflective markers on anatomical landmarks; and the ability to replicate the contractures of eight muscles of the lower limb unilaterally and bilaterally (psoas, rectus femoris, hamstring, hip adductors, gastrocnemius, soleus, tibialis posterior, and peroneus). Sixteen combinations of contractures were emulated on the

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unilateral and bilateral muscles of nine healthy participants. Two sessions of gait analysis were performed at weekly intervals to assess the reliability of the emulated contractures. Discrete variables were extracted from the kinematics to analyse the reliability. The exoskeleton did not affect normal walking when contractures were not emulated. Kinematic reliability varied from poor to excellent depending on the targeted muscle. Reliability was good for the bilateral and unilateral gastrocnemius, soleus, and tibialis posterior as well as the bilateral hamstring and unilateral hip adductors. The exoskeleton can be used to replicate contracture on healthy participants. The exoskeleton will allow us to differentiate primary and compensatory effects of muscle contractures on gait kinematics.

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DOI: 10.1016/j.gaitpost.2016.09.016

PMID: 27665088 [PubMed - in process]

Position versus force control: using the 2-DOF robotic ankle trainer to assess ankle's motor control.

Farjadian AB, Nabian M, Hartman A, Corsino J, Mavroidis C, Holden MK.

Conf Proc IEEE Eng Med Biol Soc. 2014;2014:1186-9. doi: 10.1109/EMBC.2014.6943808.

An estimated of 2,000,000 acute ankle sprains occur annually in the United States. Furthermore, ankle disabilities are caused by neurological impairments such as traumatic brain injury, cerebral palsy and stroke. The virtually interfaced robotic ankle and balance trainer (vi-RABT) was introduced as a cost-effective platform-based rehabilitation robot to improve overall ankle/balance strength, mobility and control. The system is equipped with 2 degrees of freedom (2-DOF) controlled actuation along with complete means of angle and torque measurement mechanisms. Vi-RABT was used to assess ankle strength, flexibility and motor control in healthy human subjects, while playing interactive virtual reality games on the screen. The results suggest that in the task with 2-DOF, subjects have better control over ankle's position vs. force.

DOI: 10.1109/EMBC.2014.6943808

PMID: 25570176 [PubMed - indexed for MEDLINE]

Stimulation cérébrale - Stimulation neurosensorielle

Characterization of EEG patterns in brain-injured subjects and controls after a Snoezelen(®) intervention.

Gómez C, Poza J, Gutiérrez MT, Prada E, Mendoza N, Hornero R.

Comput Methods Programs Biomed. 2016 Nov;136:1-9. doi: 10.1016/j.cmpb.2016.08.008. Epub 2016 Aug 16.

BACKGROUND AND OBJECTIVE: The aim of this study was to assess the changes induced in electroencephalographic (EEG) activity by a Snoezelen(®) intervention on individuals with brain-injury and control subjects.

METHODS: EEG activity was recorded preceding and following a Snoezelen(®) session in 18 people with cerebral palsy (CP), 18 subjects who have sustained traumatic brain-injury (TBI) and 18 controls. EEG data were analyzed by means of spectral and nonlinear measures: median frequency (MF), individual alpha frequency (IAF), sample entropy (SampEn) and Lempel-Ziv complexity (LZC).

RESULTS: Our results showed decreased values for MF, IAF, SampEn and LZC as a consequence of the therapy. The main changes between pre-stimulation and post-stimulation conditions were found in occipital and parietal brain areas. Additionally, these changes are more widespread in controls than in brain-injured subjects, which can be due to cognitive deficits in TBI and CP groups.

CONCLUSIONS: Our findings support the notion that Snoezelen(®) therapy affects central nervous system, inducing a slowing of oscillatory activity, as well as a decrease of EEG complexity and irregularity. These alterations seem to be related with higher levels of relaxation of the participants.

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DOI: 10.1016/j.cmpb.2016.08.008

PMID: 27686698 [PubMed - in process]

Corticospinal Excitability in Children with Congenital Hemiparesis.

Brain Sci. 2016 Oct 20;6(4). pii: E49.

Chen CY, Rich TL, Cassidy JM, Gillick BT

Transcranial magnetic stimulation (TMS) can be used as an assessment or intervention to evaluate or influence brain activity in children with hemiparetic cerebral palsy (CP) commonly caused by perinatal stroke. This communication report analyzed data from two clinical trials using TMS to assess corticospinal excitability in children and young adults with hemiparetic CP. The results of this communication revealed a higher probability of finding a motor evoked potential (MEP) on the non-lesioned hemisphere compared to the lesioned hemisphere ($p = 0.005$). The resting motor threshold (RMT) was lower on the non-lesioned hemisphere than the lesioned hemisphere ($p = 0.013$). There was a significantly negative correlation between age and RMT ($r_s = -0.65$, $p = 0.003$). This communication provides information regarding MEP responses, motor thresholds (MTs) and the association with age during TMS assessment in children with hemiparetic CP. Such findings contribute to the development of future pediatric studies in neuroplasticity and neuromodulation to influence motor function and recovery after perinatal stroke.

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DOI: 10.3390/brainsci6040049

PMID: 27775599 [PubMed - in process]

The International Classification of Functioning (ICF) to evaluate deep brain stimulation neuromodulation in childhood dystonia-hyperkinesia informs future clinical & research priorities in a multidisciplinary model of care.

Gimeno H, Lin JP

Eur J Paediatr Neurol. 2016 Sep 8. pii: S1090-3798(16)30150-7. doi: 10.1016/j.ejpn.2016.08.016. [Epub ahead of print]

The multidisciplinary team (MDT) approach illustrates how motor classification systems, assessments and outcome measures currently available have been applied to a national cohort of children and young people with dystonia and other hyperkinetic movement disorders (HMD) particularly with a focus on dyskinetic cerebral palsy (CP). The paper is divided in 3 sections. Firstly, we describe the service model adopted by the Complex Motor Disorders Service (CMDS) at Evelina London Children's Hospital and King's College Hospital (ELCH-KCH) for deep brain stimulation. We describe lessons learnt from available dystonia studies and discuss/propose ways to measure DBS and other dystonia-related intervention outcomes. We aim to report on current available functional outcome measures as well as some impairment-based assessments that can encourage and generate discussion among movement disorders specialists of different backgrounds regarding choice of the most important areas to be measured after DBS and other interventions for dystonia management. Finally, some recommendations for multi-centre collaboration in regards to functional clinical outcomes and research methodologies for dystonia-related interventions are proposed.

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PMID: 27707656 [PubMed - as supplied by publisher]

Therapeutic effects of functional electrical stimulation on motor cortex in children with spastic Cerebral Palsy.

Mukhopadhyay R, Mahadevappa M, Lenka PK, Biswas A.

Conf Proc IEEE Eng Med Biol Soc. 2015;2015:3432-5. doi: 10.1109/EMBC.2015.7319130.

In the present study we have evaluated the electroencephalogram (EEG) signal recorded during ankle dorsal and plantar flexion in children with spastic Cerebral Palsy (CP) after Functional Electrical Stimulation (FES) of the Tibialis Anterior (TA) muscles. The intervention group had 10 children with spastic diplegic/hemiplegic CP within the age group of 5 to 14 years of age who received both FES for 30 minutes and the conventional physiotherapy for 30 minutes a day, while the control group had 5 children who received only conventional physiotherapy for 60(30 + 30) minutes a day only. Both group were treated for 5 days a week, up to 12 weeks. The EEG data were analyzed for Peak Alpha Frequency (PAF), sensorimotor rhythm (SMR), mu wave suppression and power spectral density (PSD) of all the bands. The results showed a decrease in SMR and mu wave suppression in the intervention group as compared to the control group, indicating a positive/greater improvement in performance of motor activities. Therefore, from this study we could conclude that FES combined with conventional physiotherapy improves the motor activity in children with spastic CP.

DOI: 10.1109/EMBC.2015.7319130

PMID: 26737030 [PubMed - indexed for MEDLINE]

Active Videogaming in Youth with Physical Disability: Gameplay and Enjoyment.

Malone LA, Rowland JL, Rogers R, Mehta T, Padalabalanarayanan S, Thirumalai M, Rimmer JH
Games Health J. 2016 Oct 3. [Epub ahead of print]

OBJECTIVE: For active videogaming (AVG) to be a meaningful, health-enhancing physical activity option for youth with physical disability, factors related to game performance and enjoyment must be understood. The objective was to explore associations between quality of gameplay, controller usage, heart rate (HR), physical function, and enjoyment during AVG play in youth with physical disability.

METHODS: Participants (5 girls, 11 boys, mean age 13.8 ± 2.7 years) played four AVGs on three platforms (Nintendo[®] Wii™, Sony PlayStation3 Move, and Microsoft Xbox[®] Kinect), across three sessions. Participants' primary means of mobility were manual (n=13) and power (n=3) wheelchairs; majority were diagnosed with cerebral palsy or spina bifida. Functional level was assessed using 17 International Classification of Functioning, Disability and Health mobility items. Participants played each AVG for 8 minutes with a 5-minute rest. Quality of gameplay and ability to use controller were recorded on a five-point Likert scale. HR was recorded immediately following each game and participants completed the Physical Activity Enjoyment Scale (PACES). PACES scores were compared across games and correlations were examined among the variables.

RESULTS: PACES scores were significantly greater for Wii Punch-Out compared to Xbox Fitness, Sports Rivals, and Zumba, and for PS3 Sports Champions compared to Xbox Zumba. Higher HR was associated with higher quality of gameplay and a higher PACES score. As quality of gameplay increased, the PACES score increased.

CONCLUSION: Game performance and exercise intensity were positively correlated with AVG enjoyment in youth with physical disability, specifically mobility impairments. Further research is warranted to examine the capacity of AVG play to be an enjoyable health-enhancing activity for individuals with physical disability.

DOI: 10.1089/g4h.2015.0105

PMID: 27696899 [PubMed - as supplied by publisher]

Differences in autonomic functions as related to induced stress between children with and without cerebral palsy while performing a virtual meal-making task.

Kirshner S, Weiss PL, Tirosh E.

Res Dev Disabil. 2016 Feb-Mar;49-50:247-57. doi: 10.1016/j.ridd.2015.11.025. Epub 2015 Dec 29.

BACKGROUND: Efforts to improve the participation and performance of children with cerebral palsy (CP) are often related to the adaptation of environmental conditions to meet their cognitive and motor abilities. However, the influence of affective stimuli within the environment on emotion and performance, and their ability to improve or impede the children's participation has not been investigated in any systematic way although the emerging evidence suggests that it affects the individuals in many levels.

OBJECTIVES: (1) To measure autonomic responses to affective stimuli during a simulated Meal-Maker task in children with CP in comparison to children who are typically developing, and (2) to examine the interactions between autonomic functions, subjective reports of stress, and task performance among children with and without CP.

METHODS: Fifteen children with CP and 19 typically developing peers (6 to 12 years) participated. After completing behavioral questionnaires (e.g., State and Trait Anxiety Inventories), children prepared meals within a camera tracking virtual Meal-Maker environment. Either a negative, positive, or neutral visual stimulus was displayed, selected from the International Affective Picture System. Children also passively viewed the same pictures while rating their valence and arousal levels. Heart rate (HR) and skin conductance were recorded synchronously with stimulus onset.

RESULTS: Significant differences in autonomic functions were found between groups, i.e., a higher "low frequency" to "high frequency" (LF:HF) ratio in the children with CP during the meals associated with a negative stimulus ($p=0.011$). Only children with CP had significant positive correlations between trait anxiety and LF:HF ratio during virtual meal-making associated with positive ($p=0.049$) and negative stimuli ($p=0.003$) but not during neutral stimuli. For children with CP the amplitude of skin conductance response during passive picture viewing was significantly higher for negative than for positive stimuli ($p=0.017$) but there were no significant changes in autonomic responses during virtual Meal-Maker task. Significant correlations between trait anxiety, autonomic activity during the calm state and Meal-Maker performance outcomes were found only for children with CP.

CONCLUSIONS: In general, the Meal-Maker virtual environment was shown to be a feasible platform for the investigation of the effect of emotionally loaded stimuli on the balance of autonomic functions in children with and without CP. Anxiety level appears to play a significant role in children with CP and should be considered as a potentially important factor during clinical evaluation and intervention. Further studies are needed to develop additional measurements of emotional responses and to refine the types of affective interference.

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PMID: 26735708 [PubMed - indexed for MEDLINE]

Effects of Nintendo Wii™ Training on Occupational Performance, Balance, and Daily Living Activities in Children with Spastic Hemiplegic Cerebral Palsy: A Single-Blind and Randomized Trial.

Atsavun Uysal S, Baltaci G

Games Health J. 2016 Oct 5. [Epub ahead of print]

OBJECTIVE: This study aimed at assessing how the addition of Nintendo Wii™ (NW) system to the traditional therapy influences occupational performance, balance, and daily living activities in children with spastic hemiplegic Cerebral Palsy (CP).

MATERIALS AND METHODS: The present study is a single-blind and randomized trial involving 24 children aged 6-14 years, classified as level I or II on the Gross Motor Function Classification System. The children were allocated into two groups: an intervention and a control group, and their families participated in the study. The activity performance analysis of the children was undertaken by using the Canadian Occupational Performance Measure (COPM), functional balance was measured with the Pediatric Balance Scale (PBS), and activities of daily living were assessed with Pediatric Evaluation of Disability Inventory (PEDI). Twenty-four children with CP were randomly divided into two groups: intervention (n = 12) and control group (n = 12). All children in both groups continued their traditional physiotherapy program twice a week, 45 minutes per session, whereas the participants in the intervention group, additionally, were trained with NW, two other days of the week for 12 weeks, with each session lasting for 30 minutes.

RESULTS: Self-care, mobility, PEDI total, PBS, and performance of COPM scores increased in the NW group after intervention. Self-care, mobility, and total PEDI increased in the control group as well. However, there was no statistically significant difference found between the groups, except for PBS (P < 0.05).

CONCLUSIONS: NW contributed to the implementation of occupational performance, daily living activities, and functional balance. We recommend that NW could be used in the rehabilitation program to engage play-based activities with fun.

DOI: 10.1089/g4h.2015.0102

PMID: 27705006 [PubMed - as supplied by publisher]

Quantifying selective elbow movements during an exergame in children with neurological disorders: a pilot study.

van Hedel HJ, Häfliger N, Gerber CN

J Neuroeng Rehabil. 2016 Oct 21;13(1):93.

BACKGROUND: It is difficult to distinguish between restorative and compensatory mechanisms underlying (pediatric) neurorehabilitation, as objective measures assessing selective voluntary motor control (SVMC) are scarce.

METHODS: We aimed to quantify SVMC of elbow movements in children with brain lesions. Children played an airplane game with the glove-based YouGrabber system. Participants were instructed to steer an airplane on a screen through a cloud-free path by correctly applying bilateral elbow flexion and extension movements. Game performance measures were (i) % time on the correct path and (ii) similarity between the ideal flight path and the actually flown path. SVMC was quantified by calculating a correlation coefficient between the derivative of the ideal path and elbow movements. A therapist scored whether the child had used compensatory movements.

RESULTS: Thirty-three children with brain lesions (11 girls; 12.6 ± 3.6 years) participated. Clinical motor and cognitive scores correlated moderately with SVMC (0.50-0.74). Receiver Operating Characteristics analyses showed that SVMC could differentiate well and better than clinical and game performance measures between compensatory and physiological movements.

CONCLUSIONS: We conclude that a simple measure assessed while playing a game appears promising in quantifying SVMC. We propose how to improve the methodology, and how this approach can be easily extended to other joints.

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<http://jneuroengrehab.biomedcentral.com/articles/10.1186/s12984-016-0200-3>

DOI: 10.1186/s12984-016-0200-3

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PMID: 27769301 [PubMed - in process]

Video-game based therapy performed by children with cerebral palsy: a cross-over randomized controlled trial and a cross-sectional quantitative measure of physical activity.

Zoccolillo L, Morelli D, Cincotti F, Muzzioli L, Gobetti T, Paolucci S, Iosa M.

Eur J Phys Rehabil Med. 2015 Dec;51(6):669-76. Epub 2015 Feb 5.

BACKGROUND: Previous studies reported controversial results about the efficacy of video-game based therapy (VGT) in improving neurorehabilitation outcomes in children with cerebral palsy (CP).

AIM: Primary aim was to investigate the effectiveness of VGT with respect to conventional therapy (CT) in improving upper limb motor outcomes in a group of children with CP. Secondary aim was to quantify if VGT leads children to perform a higher number of movements.

DESIGN: A cross-over randomized controlled trial (RCT) for investigating the primary aim and a cross-sectional study for investigating the secondary aim of this study.

SETTINGS: Outpatients.

POPULATION:

INCLUSION CRITERIA: clinical diagnosis of CP, age between 4 and 14 years, level of GMFC between I and IV.

EXCLUSION CRITERIA: QI<35, severe comorbidities, incapacity to stand even with an external support.

METHODS: Twenty-two children with CP (6.89±1.91-year old) were enrolled in a cross-over RCT with 16 sessions of VGT (using Xbox with Kinect device) and then 16 of CT or vice versa. Upper limb functioning was assessed using the Quality of Upper Extremities Skills Test (QUEST) and hand abilities using Abilhand-kids score. According to the secondary aim of this study a secondary cross-sectional study has been performed. Eight children with CP (6.50±1.60-year old) were enrolled into a trial in which five wireless triaxial accelerometers were positioned on their forearms, legs and trunk for quantifying the physical activity during VGT vs. CT.

RESULTS: QUEST scores significantly improved only after VGT (P=0.003), and not after CT (P=0.056). The reverse occurred for Abilhand-kids scores (P=0.165 vs. P=0.013, respectively). Quantity of performed movements was three times higher in VGT than in CT (+198%, P=0.027).

CONCLUSION: VGT resulted effective in improving the motor functions of upper limb extremities in children with CP, conceivably for the increased quantity of limb movements, but failed in improving the manual abilities for performing activities of daily living which benefited more from CT.

CLINICAL REHABILITATION IMPACT: VGT performed using the X-Box with Kinect device could enhance the number of upper limb movements in children with CP during rehabilitation and in turn improving upper limb motor skills, but CT remained superior for improving performances in manual activities of daily living.

[Free Article](#)

PMID: 25653079 [PubMed - indexed for MEDLINE]

Thérapies cellulaires

Accelerated generation of oligodendrocyte progenitor cells from human induced pluripotent stem cells by forced expression of Sox10 and Olig2.

Li P, Li M, Tang X, Wang S, Zhang YA, Chen Z

Sci China Life Sci. 2016 Oct 25. [Epub ahead of print]

Oligodendrocyte progenitor cells (OPCs) hold great promise for treatment of dysmyelinating disorders, such as multiple sclerosis and cerebral palsy. Recent studies on generation of human OPCs mainly use human embryonic stem cells (hESCs) or neural stem cells (NSCs) as starter cell sources for the differentiation process. However, NSCs are restricted in availability and the present method for generation of oligodendrocytes (OLs) from ESCs often requires a lengthy period of time. Here, we demonstrated a protocol to efficiently derive OPCs from human induced pluripotent stem cells (hiPSCs) by forced expression of two transcription factors (2TFs), Sox10 and Olig2. With this method, PDGFRα(+) OPCs can be obtained in 14 days and O4(+) OPCs in 56 days. Furthermore, OPCs may be able to

differentiate to mature OLs that could ensheath axons when co-cultured with rat cortical neurons. The results have implications in the development of autologous cell therapies.

DOI: 10.1007/s11427-016-0165-3

PMID: 27785726 [PubMed - as supplied by publisher]

Autres

Experience of using hippotherapy in complex effects on muscle spirals in children with spastic forms of cerebral palsy.

Strashko EY, Kapustianska AA, Bobyрева LE

Wiad Lek. 2016;69(3 pt 2):527-529.

Matters of physical and medical rehabilitation of children with organic lesions of the nervous system, in particular, with cerebral palsy, are actual in countries around the world. Hippotherapy is neurophysiologically oriented therapy using horses. Determine whether a combination of hippotherapy as a method of rehabilitation in the aftermath of outpatient comprehensive impact on MS on a stationary phase; Study of the effect of hippotherapy as securing and preparation method for learning new postures and movements in children with spastic cerebral palsy forms; The study of the possible optimization of psychophysical state, activation motivations of patients; Determination of the optimal timing of hippotherapy sessions, the number of procedures, the study of possible fatigue factor children. HT classes were conducted at the Ippotsentra "Wind of Change" in the period 2010-2013 the main group of children surveyed (36 people) with spastic forms of cerebral palsy. HT procedure took place twice a day - morning and evening - 30 minutes during 10-12 days. Thus, the proposed integration of the HT program of complex effects on muscle spirals children with spastic cerebral palsy forms is physiologically and anthropologically based on 4-5 day training children adequately transferred the full amount of lessons learned new postures and movements, HT does not cause complications in the somatic and psycho-emotional state of the children, HT enables sensorimotor and psychomotor effects, save and normalize muscle tone for a longer period (up to three months), compared with traditional methods of physiotherapy. HT can serve as a method of learning a new "postures and movements", the preparation of the locomotor apparatus to learn walking.

PMID: 27717938 [PubMed - in process]

Langage – Communication

Intonation patterns in older children with cerebral palsy before and after speech intervention.

Kuschmann A, Miller N, Lowit A, Pennington L

Int J Speech Lang Pathol. 2016 Oct 5:1-11. [Epub ahead of print]

PURPOSE: This paper examined the production of intonation patterns in children with developmental dysarthria associated with cerebral palsy (CP) prior to and after speech intervention focussing on respiration and phonation. The study further sought to establish whether intonation performance might be related to changes in speech intelligibility.

METHOD: Intonation patterns were examined using connected speech samples of 15 older children with moderate to severe developmental dysarthria due to CP (9 females; age range: 11-18). Recordings were made prior to and after speech intervention based on a systems approach. Analyses are focussed on the use of intonation patterns, pitch accentuation and phrasing.

RESULT: Group analyses showed a significant increase in the use of rising intonation patterns after intervention. There were also some indications that this increase might have been related to gains in speech intelligibility for some of the children. No changes were observed regarding pitch accentuation and phrasing following intervention.

CONCLUSION: The findings highlight that changes can occur in the use of intonation patterns in children with dysarthria and CP following speech systems intervention. It is hypothesised that the emergence of the rising pattern in some of the children's intonational inventories possibly reflected improved breath support and control of laryngeal muscles.

DOI: 10.1080/17549507.2016.1216601

PMID: 27705032 [PubMed - as supplied by publisher]

Therapeutic effects of intensive voice treatment (LSVT LOUD) for children with spastic cerebral palsy and dysarthria: A phase I treatment validation study.

Boliek CA, Fox CM

Int J Speech Lang Pathol. 2016 Oct 5:1-15. [Epub ahead of print]

PURPOSE: The aim of the present study was to validate and extend the evaluation of treatment outcomes following LSVT LOUD® in children with dysarthria secondary to cerebral palsy (CP).

METHOD: Seven children (5 females, 6-10 years) with spastic quadriplegia and dysarthria received LSVT LOUD. Outcomes included: (a) quantitative and qualitative indices of communication and social functioning representing therapeutic effects and (b) features of the acoustic signal representing physiological effects on the speech mechanism. A matched group of typically developing children served as controls. Testing occurred just prior to (PRE), immediately following (POST), and at 12 weeks post-treatment (FUP).

RESULT: Expert listeners preferred voice quality and articulatory precision of children with CP at FUP as compared to PRE. Acoustic data indicated improvements on select measures of vocal functioning at POST with some maintenance at FUP. Single word intelligibility improved immediately POST, but was not maintained at FUP. Parents rated positive changes in characteristics of voice and speech and qualitative changes in communication at both POST and FUP.

CONCLUSION: The present study validated some of the previous LSVT LOUD outcomes in children with dysarthria and CP and extended our understanding of therapeutic effects through qualitative data obtained from extensive parent interviews.

DOI: 10.1080/17549507.2016.1221451

PMID: 27705010 [PubMed - as supplied by publisher]

Douleur

Analgesia by cooling vibration during venipuncture in children with cognitive impairment.

Schreiber S, Cozzi G, Rutigliano R, Assandro P, Tubaro M, Cortellazzo Wiel L, Ronfani L, Barbi E

Acta Paediatr. 2016 Jan;105(1):e12-6. doi: 10.1111/apa.13224. Epub 2015 Nov 4.

AIM: Children with cognitive impairment experience pain more frequently than healthy children and are more likely to require venipuncture or intravenous cannulation for various procedures. They are frequently unable to report pain and often receive poor pain assessment and management. This study assessed the effectiveness of physical analgesia during vascular access in children with cognitive impairments.

METHODS: We conducted a prospective randomised controlled study at a tertiary-level children's hospital in Italy from April to May 2015 to assess whether a cooling vibration device called Buzzy decreased pain during venipuncture and intravenous cannulation in children with cognitive impairment. None of the children had verbal skills and the main cognitive impairments were cerebral palsy, epileptic encephalopathy and genetic syndromes.

RESULTS: We tested 70 children with a median age of nine years: 34 in the Buzzy group and 36 in the no-intervention group. Parents were trained in the use of the Noncommunicating Children's Pain Checklist--postoperative version scale, and they reported no or mild procedural pain in 32 cases (91.4%) in the Buzzy group and in 22 cases (61.1%) in the no-intervention group ($p = 0.003$).

CONCLUSION: Cooling vibration analgesia during vascular access reduced pain in children with cognitive impairment.

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PMID: 26401633 [PubMed - indexed for MEDLINE]

Total hip replacement in young non-ambulatory cerebral palsy patients.

Morin C, Ursu C, Delecourt C.

Orthop Traumatol Surg Res. 2016 Nov;102(7):845-849. doi:10.1016/j.otsr.2016.07.010. Epub 2016 Sep 30.

INTRODUCTION: The everyday life of a non-ambulatory adolescent or young adult with cerebral palsy can be severely impaired by a painful or stiff hip. The usual surgical solutions such as proximal femoral resection (PFR) are not entirely satisfactory for pain relief, and are mutilating.

HYPOTHESIS: A retrospective study assessed the impact of total hip replacement (THR) on such impairment, on the hypothesis that it is more effective than PFR in relieving pain, without aggravating disability.

PATIENTS AND METHODS: The surgical technique consisted in implanting a dual-mobility prosthesis with uncemented acetabular component and cemented femur, after upper femoral shaft shortening and short hip-spica cast immobilization. Forty THRs were performed in 33 patients, including 31 with multiple disability. Follow-up assessment focused on change in functional status, pain, and range of motion.

RESULTS: Mean follow-up was 5 years. Pain was more or less entirely resolved. Improvement in range of motion was less striking, and there was no significant change in functional status. There were 2 general, 2 septic and 10 mechanical complications, 6 of which required surgical revision.

DISCUSSION: In non-ambulatory cerebral palsy, THR provided much better alleviation of pain than found with PFR treatment. It should be reserved for patients able to withstand fairly long surgery and with femur size compatible with implantation of a femoral component, however small.

LEVEL OF EVIDENCE: IV, retrospective study.

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DOI: 10.1016/j.otsr.2016.07.010

PMID: 27697405 [PubMed - in process]

Autres Troubles / Troubles concomitants

+Troubles respiratoires

Management of bronchial secretions with Free Aspire in children with cerebral palsy: impact on clinical outcomes and healthcare resources.

Garuti G, Verucchi E, Fanelli I, Giovannini M, Winck JC, Lusuardi M
Ital J Pediatr. 2016 Jan 20;42:7. doi: 10.1186/s13052-016-0216-0.

BACKGROUND: Management of secretions in children with cerebral palsy is often problematic due to severe deformation of the rib cage, impaired cough, and patients' inability to collaborate with chest physiotherapy. Assessing the effectiveness of different methods and techniques of secretion clearance is hampered by the lack of direct outcome measures and by limited patient cooperation. This observational study was planned to evaluate the efficacy of Free Aspire, a device that utilizes a special method to remove secretions from the bronchial tree in hypersecretive patients.

CASE PRESENTATION: Cerebral palsy patients were selected who had experienced more than 3 episodes of respiratory exacerbations in the latest year despite therapeutic optimization (including bronchial clearance techniques) and who had received at least one antibiotic course or underwent at least one access to the Emergency Room (ER) or admission to hospital in the 6 months prior to the study. Patients with congestive heart failure or contraindications for Free Aspire were excluded. We prospectively enrolled 8 patients (mean age 8.25 ± 6.11 years) who had been using in the past techniques for clearance secretions different from Free Aspire. The treatment with Free Aspire consisted of at least two 20-min sessions per day. The observational study period was 18 months. In the 6 months prior to start the treatment (T0), patients had a mean number of 4.0 ± 2.23 visits from the primary care pediatrician (PCP), spent 14 ± 20 days in hospital, and received antibiotics for 35 ± 17 days. After the first 6 months of treatment (T1), they had 1.7 ± 0.73 PCP visits, no days spent in hospital, and 9.75 ± 10.4 days of antibiotic therapy. At 12 months of treatment (T2), PCP visits were 1.7 ± 0.70 , days in hospital 1.12 ± 0.3 , and days of antibiotics 10.25 ± 10 . At 18 months of treatment (T3) no hospitalizations had occurred, PCP visits were 0.25 ± 0.70 , and days of antibiotic therapy 4.8 ± 12.62 . The technique proved to be safe and well tolerated.

CONCLUSION: Our findings show that Free Aspire for bronchial secretion clearance in cerebral palsy patients with limited capacity to collaborate is safe and effective in reducing the impact of respiratory exacerbations in terms of number of PCP visits, days spent in hospital, and days of antibiotic therapy; its regular use maintains this effect in time.

[Free PMC Article](#)

DOI: 10.1186/s13052-016-0216-0

PMCID: PMC4719384

PMID: 26791415 [PubMed - indexed for MEDLINE]

Association of Gross Motor Function Classification System Level and School Attendance with Bone Mineral Density in Patients With Cerebral Palsy.

Jung KJ, Kwon SS, Chung CY, Lee KM, Sung KH, Cho BC, Chung MK, Moon SJ, Kim J, Park MS

J Clin Densitom. 2016 Oct 11. pii: S1094-6950(16)30189-5. doi: 10.1016/j.jocd.2016.09.002. [Epub ahead of print]

The present study aimed to evaluate bone mineral density (BMD) in children and adolescents with cerebral palsy (CP) and to critically analyze the effects of a variety of factors, particularly the Gross Motor Function Classification System (GMFCS) level, the Caregiver Priorities and Child Health Index of Life with Disabilities questionnaire, and the Pediatric Outcomes Data Collection Instrument (PODCI), on BMD. Fifty patients with CP who underwent dual-energy X-ray absorptiometry were included. Collected data included the extent of involvement, muscle tone, demographic data, factors determined through chart review, and laboratory results. Factors associated with BMD in this group were analyzed by performing multiple regression analysis. The mean Z-scores in male and female patients were -3.252 ± 1.822 and -3.789 ± 1.764 , respectively, in the proximal part of the femur and -2.219 ± 1.323 and -2.451 ± 1.434 , respectively, in the lumbar spine. In multiple regression analysis, the GMFCS level and the average frequency of missed school in the PODCI were significant factors associated with both femur and lumbar spine BMD. Both the GMFCS level and school attendance were independently associated with BMD and should be considered for the prevention and management of osteoporosis in patients with CP.

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DOI: 10.1016/j.jocd.2016.09.002

PMID: 27742529 [PubMed - as supplied by publisher]

Bone mineral density and vitamin D status in children with epilepsy, cerebral palsy, and cerebral palsy with epilepsy.

Tosun A, Erisen Karaca S, Unuvar T, Yurekli Y, Yenisey C, Omurlu IK

Childs Nerv Syst. 2016 Oct 18. [Epub ahead of print]

PURPOSE: We aimed to evaluate the relationship between bone mineral density (BMD) disorders and possible risk factors in patients with epilepsy only (EO), cerebral palsy only (CPO), and cerebral palsy-epilepsy (CP + E).

METHODS: A total of 122 patients [EO (n = 54), CPO (n = 30), CP + E (n = 38)] and 30 healthy children were evaluated. BMD was only measured in patient groups, not in control subjects. BMD of lumbar vertebrae was determined by dual energy X-ray absorptiometry (DXA). An abnormal BMD was defined as low or low normal BMD.

RESULTS: Low BMD rate in EO, CPO, and CP + E group was 3.7, 50, and 39.5 %, respectively. Abnormal BMD values were significantly related to inadequate dietary Ca intake (p = 0.017), severe intellectual disability (p < 0.001), and immobility (p = 0.018). In multivariate regression analysis, the risk of abnormal BMD was higher (3.9-fold) in patients not able to walk independently than the others (p = 0.029). However, serum Ca-Vitamin D levels, insufficient exposure to sunlight, low BMI, and use of AED were not correlated with abnormal BMD.

CONCLUSION: Abnormal BMD is a common problem in patients with CP and CP + E. Abnormal BMD was related to the severity of CP, but not to vitamin D levels or AED treatment.

DOI: 10.1007/s00381-016-3258-0

PMID: 27757568 [PubMed - as supplied by publisher]

Cortical bone deficit and fat infiltration of bone marrow and skeletal muscle in ambulatory children with mild spastic cerebral palsy.

Whitney DG, Singh H, Miller F, Barbe MF, Slade JM, Pohlig RT, Modlesky CM

Bone. 2016 Oct 11;94:90-97. doi: 10.1016/j.bone.2016.10.005. [Epub ahead of print]

INTRODUCTION: Nonambulatory children with severe cerebral palsy (CP) have underdeveloped bone architecture, low bone strength and a high degree of fat infiltration in the lower extremity musculature. The present study aims to determine if such a profile exists in ambulatory children with mild CP and if excess fat infiltration extends into the bone marrow.

MATERIALS AND METHODS: Ambulatory children with mild spastic CP and typically developing children (4 to 11years; 12/group) were compared. Magnetic resonance imaging was used to estimate cortical bone, bone marrow and total bone volume and width, bone strength [i.e., section modulus (Z) and polar moment of inertia (J)], and bone marrow fat concentration in the midtibia, and muscle volume, intermuscular, subfascial, and subcutaneous adipose tissue (AT) volume and intramuscular fat concentration in the midleg. Accelerometer-based activity monitors worn on the ankle were used to assess physical activity.

RESULTS: There were no group differences in age, height, body mass, body mass percentile, BMI, BMI percentile or tibia length, but children with CP had lower height percentile (19th vs. 50th percentile) and total physical activity counts (44%) than controls (both $p < 0.05$). Children with CP also had lower cortical bone volume (30%), cortical bone width in the posterior (16%) and medial (32%) portions of the shaft, total bone width in the medial-lateral direction (15%), Z in the medial-lateral direction (34%), J (39%) and muscle volume (39%), and higher bone marrow fat concentration ($82.1 \pm 1.8\%$ vs. $80.5 \pm 1.9\%$), subfascial AT volume (3.3 fold) and intramuscular fat concentration ($25.0 \pm 8.0\%$ vs. $16.1 \pm 3.3\%$) than controls (all $p < 0.05$). When tibia length was statistically controlled, all group differences in bone architecture, bone strength, muscle volume and fat infiltration estimates, except posterior cortical bone width, were still present (all $p < 0.05$). Furthermore, a higher intermuscular AT volume in children with CP compared to controls emerged ($p < 0.05$).

CONCLUSIONS: Ambulatory children with mild spastic CP exhibit an underdeveloped bone architecture and low bone strength in the midtibia and a greater infiltration of fat in the bone marrow and surrounding musculature compared to typically developing children. Whether the deficit in the musculoskeletal system of children with CP is associated with higher chronic disease risk and whether the deficit can be mitigated requires further investigation.

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DOI: 10.1016/j.bone.2016.10.005

PMID: 27732905 [PubMed - as supplied by publisher]

Four years survival and marginal bone loss of implants in patients with Down syndrome and cerebral palsy.

Corcuera-Flores JR, López-Giménez J, López-Jiménez J, López-Giménez A, Silvestre-Rangil J, Machuca-Portillo G
Clin Oral Investig. 2016 Oct 14. [Epub ahead of print]

OBJECTIVES: To evaluate implant survival rate and marginal bone loss (MBL) after 4 years in patients with Down syndrome and cerebral palsy, compared with a healthy control group.

MATERIAL AND METHODS: The case group comprises 102 implants in 19 patients (71 cerebral palsy, 21 Down syndrome), and the control group comprises 70 implants in 22 healthy patients. One implant per patient was selected ($n = 41$ implants) to take clustering effects into account. MBL was measured using two panoramic radiographs (after surgery and 4 years later). Lagervall-Jansson's Index was used. Statistics used are chi-squared test and Haberman's post hoc test. p Value is significant at < 0.05 .

RESULTS: MBL was significantly higher in the cases in all samples ($p < 0.001$) and when one implant was selected per patient ($p < 0.05$). More implants were lost in the cases ($p < 0.01$), especially those with a higher MBL ($p < 0.01$). MBL ($p < 0.05$) and implant loss ($p < 0.01$) increased with age in the cases. The three-unit fixed dental prosthesis (FDP) showed higher MBL ($p < 0.05$). Down syndrome had a higher MBL than cerebral palsy (entire sample $p < 0.0001$, one implant per patient $p < 0.05$). All patients with Down syndrome saw some damage to bone support (entire sample $p < 0.0001$; one implant per patient $p < 0.05$). Implant loss occurred only in Down syndrome ($p < 0.00001$).

CONCLUSIONS: MBL and implant loss 4 years after placement are higher in neuropsychiatric disabilities. Down syndrome has a higher risk of MBL and implant loss; therefore, special precautions should be taken when deciding on treatment for these patients.

CLINICAL RELEVANCE: As a consequence of this pilot study, professionals should be very cautious in placing implants in patients with Down syndrome.

DOI: 10.1007/s00784-016-1970-5

PMID: 27743213 [PubMed - as supplied by publisher]

Pamidronate Treatment to Prevent Reoccurring Fractures in Children With Cerebral Palsy.

Sees JP, Sitoula P, Dabney K, Holmes L Jr, Rogers KJ, Kecskemethy HH, Bachrach S, Miller F.
J Pediatr Orthop. 2016 Mar;36(2):193-7. doi: 10.1097/BPO.0000000000000421.

BACKGROUND: Some children with cerebral palsy (CP) have frequent fractures due to low bone mineral density and receive treatment with pamidronate, an intravenous bisphosphonate. Our review evaluates the outcome of pamidronate treatment in these children.

METHODS: A retrospective chart review was performed, and 32 patients (14 girls and 18 boys) with CP Gross Motor Function Classification System level III (2 patients), IV (3 patients), and V (27 patients) treated with 5 courses of pamidronate for low mineral density were identified. Patients with a minimum of 2 years of follow-up were included in the study. Data collection was a review of the demographics and pretreatment, peritreatment, and posttreatment fracture history.

RESULTS: The mean age at treatment was 11.6 years (range, 2.9 to 19.6 y). There were 102 fractures (mean duration 2.5 y) pretreatment and 28 fractures posttreatment. With an average follow-up of 6.4 years, posttreatment rate of fracture decreased to 0.10 fractures per year from the pretreatment rate of 2.4 fractures per year ($P < 0.001$). The femur was the most common bone fractured both pretreatment (54%) and posttreatment (61%); the major site was the distal third of the femur. There were 11 fractures during the course of pamidronate treatment at a rate of 0.33 fractures per year. Only 11 patients (34%) sustained fracture posttreatment. No correlation with fracture pattern or occurrence was found with patient age, number of pretreatment fractures, or sex. Most fractures were caused by low-energy injuries, and most were managed nonoperatively.

CONCLUSIONS: In patients with CP and disuse osteoporosis, the most common fracture sustained involved the distal femur via low-velocity injury, and most fractures were treated nonoperatively. Although the fracture pattern and the treatment remained unchanged, reoccurring fractures in these children can be effectively treated medically to interrupt the fracturing tendency.

DOI: 10.1097/BPO.0000000000000421

PMID: 25757207 [PubMed - indexed for MEDLINE]

Troubles digestifs

The effects of connective tissue manipulation and Kinesio Taping on chronic constipation in children with cerebral palsy: a randomized controlled trial.

Orhan C, Kaya Kara O, Kaya S, Akbayrak T, Kerem Gunel M, Baltaci G

Disabil Rehabil. 2016 Oct 28:1-11. [Epub ahead of print]

PURPOSE: The aim of this study was to investigate the effects of connective tissue manipulation (CTM) and Kinesio Taping® (KT) on constipation and quality of life in children with cerebral palsy (CP).

METHOD: This study was designed as a randomized controlled trial. Forty children diagnosed with chronic constipation based on Rome III criteria were randomly assigned to CTM group [6 females, 7 males; 8 y 6 mo (SD = 3y 4 mo)], KT group [7 female, 7 male; 8y 7 mo (SD = 3y 5 mo)] or control group [6 female, 7 male; 8y 3 mo (SD = 3y 6 mo)]. All patients were assessed with 7-day bowel diaries, Bristol Stool Form Scale (BSFS), Visual Analog Scale (VAS), and Pediatric Quality of Life Inventory (PEDsQL). Kruskal-Wallis, Wilcoxon's signed-rank, and Mann-Whitney U tests were used to determine intra-group and inter-group differences. The level of significance was $p < 0.05$.

RESULTS: Among the CTM, KT, and control groups, there were statistically significant differences regarding the changes in defecation frequency (2.46, 3.00, 0.30, ES 1.16, $p < 0.001$), duration of defecation (5.07, 5.35, 0.15, ES 2.37, $p = 0.003$), BSFS (1.84, 2.14, 0.07, ES 0.91, $p < 0.001$), VAS (4.83, 3.87, 0.23, ES 1.98, $p < 0.001$), and PEDsQL total scores (7, 14, 8.36, -0.85, ES 4.08, $p < 0.001$).

CONCLUSIONS: This study revealed that CTM and KT seem equally effective physiotherapy approaches for the treatment of pediatric constipation and these approaches may be added to bowel rehabilitation program. Implications for rehabilitation CTM and KT have similar effectiveness in alleviating the constipation-related symptoms and improving quality of life in children with CP. CTM and KT can be integrated into bowel rehabilitation programs. Considering the characteristics of patients, these treatment options can be used as an alternative of each other by physiotherapists.

DOI: 10.1080/09638288.2016.1236412

PMID: 27793072 [PubMed - as supplied by publisher]

Troubles cardio vasculaires

An innovative cycling exergame to promote cardiovascular fitness in youth with cerebral palsy.

Knights S, Graham N, Switzer L, Hernandez H, Ye Z, Findlay B, Xie WY, Wright V, Fehlings D
Dev Neurorehabil. 2016;19(2):135-40. doi: 10.3109/17518423.2014.923056. Epub 2014 Jun 20

OBJECTIVE: To evaluate the effects of an internet-platform exergame cycling programme on cardiovascular fitness of youth with cerebral palsy (CP).

METHODS: In this pilot prospective case series, eight youth with bilateral spastic CP, Gross Motor Functional Classification System (GMFCS) level III, completed a six-week exergame programme. Outcomes were obtained at baseline and post-intervention. The primary outcome measure was the GMFCS III-specific shuttle run test (SRT-III). Secondary outcomes included health-related quality of life (HQL) as measured by the KIDSCREEN-52 questionnaire, six-minute walk test, Wingate arm cranking test and anthropomorphic measurements.

RESULTS: There were significant improvements in the SRT-III ($t = -2.5$, $p = 0.04$, $d = 0.88$) post-intervention. There were no significant changes in secondary outcomes.

CONCLUSION: An exergame cycling programme may lead to improvement in cardiovascular fitness in youth with CP. This study was limited by small sample size and lack of a comparison group. Future research is warranted.

DOI: 10.3109/17518423.2014.923056

PMID: 24950349 [PubMed - indexed for MEDLINE]

Nutrition – Troubles nutritionnels

Escape Extinction and Negative Reinforcement in the Treatment of Pediatric Feeding Disorders: a Single Case Analysis.

Voulgarakis H, Forte S

Behav Anal Pract. 2015 Sep 3;8(2):212-214. eCollection 2015

Pediatric feeding disorders are common among children with developmental disabilities and can have detrimental effects on growth and development. An escape extinction and negative reinforcement-based approach to treating food refusal was examined in a child with cerebral palsy. A changing criterion treatment design was implemented, which allowed the child to exit the treatment area contingent upon the acceptance and ingestion of a pre-determined number of bites. Food acceptance ranged from one to three bites at baseline and exceeded the pre-set criteria for mastery, at 14 bites during the final intervention phase. The study will contribute to the current literature on negative reinforcement procedures used in the treatment of pediatric feeding problems. The study will contribute to increasing the availability of literature pertaining to pediatric feeding problems among children with complex disabilities such as cerebral palsy. The intervention is brief with components to the treatment package which increases utility and ease of implementation. The study demonstrates the applicability of changing criterion design within clinical settings.

[Free PMC Article](#)

DOI: 10.1007/s40617-015-0086-8

PMID: 27703921 [PubMed - in process]

Sphère bucco-dentaire – Troubles de la déglutition

Dental health of children with cerebral palsy.

Jan BM, Jan MM.

Neurosciences (Riyadh). 2016 Oct;21(4):314-318. doi: 10.17712/nsj.2016.4.20150729.

Cerebral palsy (CP) is a common chronic motor disorder with associated cognitive, communicative, and seizure disorders. Children with CP have a higher risk of dental problems creating significant morbidity that can further affect their wellbeing and negatively impact their quality of life. Screening for dental

disease should be part of the initial assessment of any child with CP. The objective of this article is to present an updated overview of dental health issues in children with CP and outline important preventative and practical strategies to the management of this common comorbidity. Providing adequate oral care requires adaptation of special dental skills to help families manage the ongoing health issues that may arise. As oral health is increasingly recognized as a foundation for general wellbeing, caregivers for CP patients should be considered an important component of the oral health team and must become knowledgeable and competent in home oral health practices.
PMID: 27744459 [PubMed - in process]

Evaluation of low-level laser therapy in the treatment of masticatory muscles spasticity in children with cerebral palsy.

Santos MT, Diniz MB, Gouw-Soares SC, Lopes-Martins RA, Frigo L, Baeder FM
J Biomed Opt. 2016 Feb;21(2):28001. doi: 10.1117/1.JBO.21.2.028001.

Spasticity is a motor disorder frequently present in individuals with cerebral palsy (CP). This study aimed to evaluate the effect of low-level laser therapy (LLLT) on the spasticity of the masseter and anterior temporal muscle fibers in children with CP over three weeks of intermittent laser exposures. The bite force (BF) of the masticatory muscles and the amplitude of mouth opening were evaluated before and after laser irradiation in 30 children with CP. Both sides of the masseter and temporalis muscles were irradiated with low-intensity diode laser pulses of 808-nm wavelength six times over three consecutive weeks. During the subsequent three weeks of postlaser exposures, although no laser treatment was applied, the evaluation parameters were measured and recorded. A significant improvement in the amplitude of mouth opening and a decrease in the BF were observed in the weeks following LLLT ($P < 0.05$). However, by the sixth week post-LLLT, the BF and the amplitude of mouth opening reverted to values equivalent to those obtained before the first application of LLLT. Our investigation revealed low-level energy exposures from a 808-nm diode laser to be an effective short-term therapeutic tool. This method increased the amplitude of mouth opening and decreased the muscle tonus of children with spastic CP over a time course of three weeks of intermittent laser applications.

DOI: 10.1117/1.JBO.21.2.028001

PMID: 26882450 [PubMed - indexed for MEDLINE]

Orthodontic treatment and follow-up of a patient with cerebral palsy and spastic quadriplegia.

Çifter M, Cura N.

Am J Orthod Dentofacial Orthop. 2016 Oct;150(4):670-678. doi: 10.1016/j.ajodo.2015.10.031.

INTRODUCTION: This report describes the clinical orthodontic management of a patient with spastic quadriplegia and cerebral palsy. Guidelines to overcome difficulties encountered during the treatment period are suggested.

METHODS: A 13-year-old boy with cerebral palsy and spastic quadriplegia complained of an undesirable oral appearance because of his malocclusion. He had a Class II molar relationship, with severe maxillary and moderate mandibular anterior crowding. Enamel hypoplasia was apparent on all teeth. He had losses of body function and upper extremity function of 70% and 39%, respectively. His physical limitations necessitated a treatment approach that did not rely on patient-dependent appliances. The treatment plan called for maxillary first premolar extractions, mandibular incisor protrusion, and air rotor stripping.

RESULTS: The patient's oral function and esthetic appearance were significantly improved. Aligned dental arches with good occlusion were obtained. The patient's self-confidence improved during the treatment period.

CONCLUSIONS: Physical appearance can influence personality and social acceptability. Corrective orthodontic treatment for patients with physical handicaps can improve not only oral function, but also self-confidence and self-esteem.

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DOI: 10.1016/j.ajodo.2015.10.031

PMID: 27692425 [PubMed - in process]

Troubles visuels

Impact of Cerebral Visual Impairments on Motor Skills: Implications for Developmental Coordination Disorders.

Chokron S, Dutton GN

Front Psychol. 2016 Oct 4;7:1471. eCollection 2016.

Cerebral visual impairment (CVI) has become the primary cause of visual impairment and blindness in children in industrialized countries. Its prevalence has increased sharply, due to increased survival rates of children who sustain severe neurological conditions during the perinatal period. Improved diagnosis has probably contributed to this increase. As in adults, the nature and severity of CVI in children relate to the cause, location and extent of damage to the brain. In the present paper, we define CVI and how this impacts on visual function. We then define developmental coordination disorder (DCD) and discuss the link between CVI and DCD. The neuroanatomical correlates and aetiologies of DCD are also presented in relationship with CVI as well as the consequences of perinatal asphyxia (PA) and preterm birth on the occurrence and nature of DCD and CVI. This paper underlines why there are both clinical and theoretical reasons to disentangle CVI and DCD, and to categorize the features with more precision. In order to offer the most appropriate rehabilitation, we propose a systematic and rapid evaluation of visual function in at-risk children who have survived preterm birth or PA whether or not they have been diagnosed with cerebral palsy or DCD.

DOI: 10.3389/fpsyg.2016.01471

PMID: 27757087 [PubMed - in process]

Gross motor function in children with spastic Cerebral Palsy and Cerebral Visual Impairment: A comparison between outcomes of the original and the Cerebral Visual Impairment adapted Gross Motor Function Measure-88 (GMFM-88-CVI).

Salavati M, Rameckers EA, Waninge A, Krijnen WP, Steenbergen B, van der Schans CP

Res Dev Disabil. 2016 Oct 19. pii: S0891-4222(16)30227-X. doi: 10.1016/j.ridd.2016.10.007. [Epub ahead of print]

PURPOSE: To investigate whether the adapted version of the Gross Motor Function Measure-88 (GMFM-88) for children with Cerebral Palsy (CP) and Cerebral Visual Impairment (CVI) results in higher scores. This is most likely to be a reflection of their gross motor function, however it may be the result of a better comprehension of the instruction of the adapted version.

METHOD: The scores of the original and adapted GMFM-88 were compared in the same group of children (n=21 boys and n=16 girls), mean (SD) age 113 (30) months with CP and CVI, within a time span of two weeks. A paediatric physical therapist familiar with the child assessed both tests in random order. The GMFCS level, mental development and age at testing were also collected. The Wilcoxon signed-rank test was used to compare two different measurements (the original and adapted GMFM-88) on a single sample, (the same child with CP and CVI; p<0.05).

RESULTS: The comparison between scores on the original and adapted GMFM-88 in all children with CP and CVI showed a positive difference in percentage score on at least one of the five dimensions and positive percentage scores for the two versions differed on all five dimensions for fourteen children. For six children a difference was seen in four dimensions and in 10 children difference was present in three dimensions (GMFM dimension A, B & C or C, D & E) (p<0.001).

CONCLUSION: The adapted GMFM-88 provides a better estimate of gross motor function per se in children with CP and CVI that is not adversely impacted by their visual problems. On the basis of these findings, we recommend using the adapted GMFM-88 to measure gross motor functioning in children with CP and CVI.

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PMID: 27771178 [PubMed - as supplied by publisher]

Troubles du Sommeil

Co-sleeping in school-aged children with a motor disability: a comparative population-based study.

Jacquier D, Newman CJ

Science Infos Paralysie Cérébrale, Septembre 2016, FONDATION PARALYSIE CEREBRALE 67 rue Vergniaud 75013 Paris - tel +33 1 45 54 03 03 contact: Christine Doumergue
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AIM: To determine the prevalence and determinants of co-sleeping in school-aged children with a motor disability compared with the school-aged general population.

METHOD: A questionnaire on demographic characteristics and co-sleeping habits, along with the Sleep Disturbance Scale for Children (SDSC), was sent to parents of children aged between 4 years and 18 years followed in our tertiary paediatric neurorehabilitation clinic, and to school-aged children in a representative sample of state schools.

RESULT: We analysed responses for 245 children with motor disability (142 males, 103 females; mean age 10y 6mo, standard deviation [SD] 3y 10mo, range 4-18y) and 2891 of the general population (1484 males, 1497 females; mean age [SD] 9y 6mo [3y 5mo], range 4-18y) (response rates 37% and 26% respectively). Cerebral palsy was the most common diagnosis among children with motor disability. Weekly co-sleeping was significantly more common in children with motor disability than in the general population (11.8% vs 7.9% respectively, $p=0.032$). Special care of the child with motor disability at night, mainly addressing epilepsy, was reported as a cause of co-sleeping by two-thirds of parents. Factors associated with co-sleeping in the motor disability group were age, housing crowding, severe visual impairment, and pathological sleep according to the SDSC.

INTERPRETATION: Co-sleeping is common among children with motor disability. It is influenced by personal and medical factors, as well as the requirements for special care at night. Therefore, health professionals should explore sleeping arrangements in families of children with motor disability.

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PMID: 27779314 [PubMed - as supplied by publisher]

Effects of botulinum toxin serotype A on sleep problems in children with cerebral palsy and on mothers sleep quality and depression.

Binay Safer V, Ozbudak Demir S, Ozkan E, Demircioglu Guneri F.

Neurosciences (Riyadh). 2016 Oct;21(4):331-337. doi: 10.17712/nsj.2016.4.20160207.

OBJECTIVE: To evaluate botulinum toxin serotype A (BoNT-A) effects on sleep problems in children with cerebral palsy (CP) and on mothers' sleep quality and depression at multiple time points.

METHODS: This is a single center, cross sectional, and observational study was conducted to assess children with CP who were admitted. We recruited children with CP who were admitted to Ministry of Health Physical Medicine and Rehabilitation Training and Research Hospital, Ankara, Turkey between September 2012 and April 2014 for the BoNT-A injection for lower limb spasticity. Sleep quality of children with CP were determined at baseline and at the first, third and sixth month after the BoNT-A injection. Sleep quality Pittsburgh Sleep Quality Index (PSQI) and depression (by Beck Depression Inventory-II Turkish version) in mothers were also assessed.

RESULTS: Twenty-four children with CP (7.05+/-2.69 years) underwent final assessment. Their bedtime resistance (11.71+/-3.26 versus (vs) 10+/-2.75, $p<0.01$), sleep anxiety (8.00+/-2.57 vs. 7.13+/-2.27, $p=0.046$) and daytime sleepiness (11.67+/-2.14 vs. 10.25+/-1.96, $p<0.01$) were significantly improved in the first month after the BoNT-A injection. In accordance with this, PSQI and BDI scores of the mothers decreased in the first month after the BoNT-A injection. Thereafter, BDI scores continued to decrease, whereas PSQI slightly increased in the third month.

CONCLUSION: The BoNT-A injection for spasticity in children with CP may have the potential to improve sleep quality in children with CP and their primary caregiver, the mother, as well as to reduce depression in the mother.

PMID: 27744462 [PubMed - in process]

Troubles psychologiques / psychiatrique

Screening for psychopathology in a national cohort of 8- to 15-year-old children with cerebral palsy.

Rackauskaite G, Bilenberg N, Bech BH, Uldall P, Østergaard JR

Res Dev Disabil. 2016 Feb-Mar;49-50:171-80. doi: 10.1016/j.ridd.2015.11.019. Epub 2015 Dec 17.

Cerebral palsy (CP) is often accompanied by psychopathology and learning disability.

AIMS: (1) to evaluate the prevalence of psychopathology as estimated by the Child Behavior Checklist (CBCL) parental questionnaire in 8- to 15-year-old Danish children with CP and to analyze its association with cognitive

ability and families' social characteristics; (2) to examine to what extent children with CP had been evaluated by a child psychiatrist and/or psychologist.

METHOD: The parents of 462 children with CP answered a questionnaire about their child's treatment and the family's characteristics and 446 the CBCL. The cutoff for psychopathology was the Total CBCL score or DSM-oriented scores above the 93rd percentile in an age- and gender-stratified population.

RESULTS: The psychopathology screening was positive in 46.2% (CI 41.6-50.8%) against 15.1% in general population. Cognitive disability was associated with an increased prevalence of psychopathology (odds ratio (OR) 2.6, CI 1.4-4.6, for Developmental Quotient of cognitive function (DQ) 50-85 and OR 3.0, CI 1.3-7.0, for DQ<50). Children with CP and a single parent showed increased odds for a positive CBCL screening compared to children living with two parents (OR 2.1, 95% CI 1.1-4.0). Children with DQ 50-85 more often had a psychological evaluation. A positive CBCL screening was strongly associated with a psychiatric assessment (21% vs. 7%, $p<0.01$).

CONCLUSION: The high prevalence of emotional and behavioral problems indicates that screening for psychopathology should be a part of multidisciplinary follow-up of CP. The CBCL can be used as a screening instrument in children with CP without severe motor and cognitive disability.

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Management of Sleep Disorders in Children With Neurodevelopmental Disorders: A Review.

Blackmer AB, Feinstein JA

Pharmacotherapy. 2016 Jan;36(1):84-98. doi: 10.1002/phar.1686.

Neurodevelopmental disorders (NDDs) are defined as a group of disorders caused by changes in early brain development, resulting in behavioral and cognitive alterations in sensory and motor systems, speech, and language. NDDs affect approximately 1-2% of the general population. Up to 80% of children with NDDs are reported to have disrupted sleep; subsequent deleterious effects on daytime behaviors, cognition, growth, and overall development of the child are commonly reported. Examples of NDDs discussed in this review include autism spectrum disorder, cerebral palsy, Rett syndrome, Angelman syndrome, Williams syndrome, and Smith-Magenis syndrome. The etiology of sleep disorders in children with NDDs is largely heterogeneous and disease specific. The diagnosis and management of sleep disorders in this population are complex, and little high-quality data exist to guide a consistent approach to therapy. Managing sleep disorders in children with NDDs is critical both for the child and for the family but is often frustrating due to the refractory nature of the problem. Sleep hygiene must be implemented as first-line therapy; if sleep hygiene alone fails, it should be combined with pharmacologic management. The available evidence for the use of common pharmacologic interventions, such as iron supplementation and melatonin, as well as less common interventions, such as melatonin receptor agonists, clonidine, gabapentin, hypnotics, trazodone, and atypical antipsychotics is reviewed. Further, parents and caregivers should be provided with appropriate education on the nature of the sleep disorders and the expectation for modest pharmacologic benefit, at best. Additional data from well-designed trials in children with NDDs are desperately needed to gain a better understanding of sleep pharmacotherapy including efficacy and safety implications. Until then, clinicians must rely on the limited available data, as well as clinical expertise, when managing sleep disorders in the population of children with NDDs.

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PMID: 26799351 [PubMed - indexed for MEDLINE]

Troubles de la croissance

Hypopituitarism in children with cerebral palsy.

Uday S, Shaw N, Krone R, Kirk J

Arch Dis Child. 2016 Oct 27. pii: archdischild-2016-311012. doi: 10.1136/archdischild-2016-311012. [Epub ahead of print]

Poor growth and delayed puberty in children with cerebral palsy is frequently felt to be related to malnutrition. Although growth hormone deficiency is commonly described in these children, multiple pituitary hormone deficiency

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(MPHD) has not been previously reported. We present a series of four children with cerebral palsy who were born before 29 weeks gestation who were referred to the regional endocrinology service, three for delayed puberty and one for short stature, in whom investigations identified MPHD. All patients had a height well below -2 standard deviation score (2nd centile) at presentation and three who had MRI scans had an ectopic posterior pituitary gland. We therefore recommend that the possibility of MPHD should be considered in all children with cerebral palsy and poor growth or delayed puberty. Early diagnosis and treatment is essential to maximise growth and prevent associated morbidity and mortality.

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PMID: 27789461 [PubMed - as supplied by publisher]

Qualité de vie et rapport au monde

+Qualité de vie

Health Related Quality of Life and Care Giver Burden Following Spinal Fusion in Children with Cerebral Palsy.

DiFazio R, Miller P, Vessey JA, Snyder B.

Spine (Phila Pa 1976). 2016 Oct 25. [Epub ahead of print]

STUDY DESIGN: Prospective longitudinal cohort

OBJECTIVE.: Evaluate changes in caregivers' perceptions of health related quality of life (HRQOL) and caregiver burden in children with severe cerebral palsy (CP) following spinal fusion.

SUMMARY OF BACKGROUND DATA: Progressive scoliosis is common in non-ambulatory children with CP; the utility of spine fusion has been long debated and prospective evaluations of patient reported outcomes are limited.

METHODS: Children 3-21 years old, GMFCS IV-V CP, scheduled for spine fusion were enrolled consecutively from September 2011-March 2014. Caregivers completed the CPCHILD and ACEND pre-operatively and at 6 weeks, 3, 6, 12, and 24 months post-operatively. Changes in CPCHILD™ and ACEND scores from pre-operative to 1 and 2 years after surgery were assessed using paired t-tests. Correlations between pre-operative Cobb angle and CPCHILD™ and ACEND scores were evaluated using Pearson's correlation analysis.

RESULTS: Twenty-six GMFCS IV-V CP patients with severe scoliosis treated with spine fusion were included. Mean age was 14 years, 50% male, 46% had instrumentation to the pelvis. Average pre-operative Cobb angle was 68.9° (SD 25.68) with an average improvement of 76%. The CPCHILD™ score increased by 9.8 points above baseline (95% CI: 3.4 to 16.2) at 1 year post-operatively (p=0.005). However, at 2 years, the CPCHILD™ score regressed to baseline (p=0.40). ACEND scores did not change from baseline scores at 1 year (p=0.09) and 2 year (0.72) follow-up; reflecting that caregiver burden is little changed by spine fusion. While there was no correlation between pre-operative Cobb angle and CPCHILD™ score (p=0.52) or ACEND score (p=0.56) at 1 year or 2 year follow-up (p=0.69, p=0.90). Children with Cobb ≤ 75° experienced more improvement 1 year after surgery than children with Cobb >75°.

CONCLUSIONS: HRQOL improves 1 year following spine fusion but regresses to baseline after 2 years. Caregiver burden was unchanged following spine fusion.

LEVEL OF EVIDENCE: 2.

DOI: 10.1097/BRS.0000000000001940

PMID: 27792122 [PubMed - as supplied by publisher]

Do environmental barriers affect the parent-reported quality of life of children and adolescents with cerebral palsy?

Badia M, Begoña Orgaz M, Gómez-Vela M, Verdugo MA, Ullán AM, Longo E

Res Dev Disabil. 2016 Feb-Mar;49-50:312-21. doi: 10.1016/j.ridd.2015.12.011. Epub 2016 Jan 11.

Physical, social, and attitudinal environment may affect the quality of life (QoL) of children and adolescents with cerebral palsy (CP). Participants in this study included parents of 206 children and adolescents with CP (55.8% males) aged 8-18 years (M=11.96, SD=3). Distribution according to the Gross Motor Function Classification System (GMFCS) was 24.3% level I, 18% level II, 18% level III, 12.6% level IV, and 27.2 level V. Environmental barriers were

assessed with the Spanish version of the European Child Environment Questionnaire (ECEQ), and QoL was assessed with the KIDSCREEN parents' version. The results of the correlation analysis revealed that GMFCS level, IQ, and type of schooling are significantly correlated with QoL. Barriers were also associated with QoL. A series of hierarchical regression analyses indicated that, after controlling for the effect of child and parent's variables, barriers at home and at school significantly contribute to QoL. These findings underscore the importance of providing interventions to produce environmental changes that contribute to the improvement of QoL.

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PMID: 26788697 [PubMed - indexed for MEDLINE]

Proxy-reported quality of life in adolescents and adults with dyskinetic cerebral palsy is associated with executive functions and cortical thickness.

Laporta-Hoyos O, Ballester-Plané J, Póo P, Macaya A, Meléndez-Plumed M, Vázquez E, Delgado I, Zubiaurre-Elorza L, Botellero VL, Narberhaus A, Toro-Tamargo E, Segarra D, Pueyo R

Qual Life Res. 2016 Oct 20. [Epub ahead of print]

PURPOSE: Quality of life (QOL) is a key outcome for people with cerebral palsy (CP), and executive functioning is an important predictor of QOL in other health-related conditions. Little is known about this association in CP or about its neural substrate. We aim to analyze the influence of executive functioning (including cognitive flexibility) as well as that of other psychological, motor, communication and socioeconomic variables on QOL and to identify neuroanatomical areas related to QOL in adolescents and adults with CP.

METHODS: Fifty subjects diagnosed with dyskinetic CP (mean age 25.96 years) were recruited. Their caregivers completed the primary caregiver proxy report version of the CP QOL-Teen questionnaire. Motor status, communication, IQ, four executive function domains, anxiety/depression and socioeconomic status were evaluated. Correlations and multiple linear regression models were used to relate CP QOL domains and total score to these variables. Thirty-six participants underwent an MRI assessment. Correlations were examined between cortical thickness and CP QOL total score and between cortical thickness and variables that might predict the CP QOL total score.

RESULTS: Executive functions predict scores in four domains of CP QOL (General well-being and participation, Communication and physical health, Family health and Feelings about functioning) in the regression model. Among the cognitive domains that comprise executive function, only cognitive flexibility measured in terms of performance on the Wisconsin card sorting test (WCST) predicts the CP QOL total score. Monthly income, fine motor functioning and communication ability predict scores on the domains Access to services and Family Health, Feelings about functioning and School well-being, respectively. The clusters resulting from the correlation between cortical thickness and both CP QOL total score and WCST performance overlapped in the posterior cingulate and precuneus cortices.

CONCLUSIONS: Cognitive flexibility predicts proxy report CP QOL-Teen total score in dyskinetic CP. This relationship has its anatomical correlate in the posterior cingulate and precuneus cortices.

DOI: 10.1007/s11136-016-1433-0

PMID: 27766516 [PubMed - as supplied by publisher]

Quality of life of Finnish children with cerebral palsy.

Böling S, Varho T, Kiviranta T, Haataja L

Disabil Rehabil. 2016;38(7):683-8. doi: 10.3109/09638288.2015.1061607. Epub 2015 Jun 29.

PURPOSE: The aim of this study was to examine the quality of life (QOL) of Finnish children with cerebral palsy (CP) in different parts of Finland from the children's and caregivers' perspectives. The acceptability of the Finnish version of the CP QOL-Child questionnaire for clinical use is also evaluated.

METHOD: This study was conducted in 2010-2013 as a part of the national CP-project. It is based on validated CP QOL-Child questionnaires. Children between 9 and 12 years were asked to fill in the child-self-report version. Caregivers who had a 4- to 12-year-old child with CP filled in parent-proxy reports.

RESULTS: Responses were obtained from 63 children and 161 caregivers. The response rates were 63 and 60%, respectively. Overall QOL was reported to be fairly good with no significant regional differences within Finland. Children reported significantly higher QOL in all QOL-domains except "social wellbeing and acceptance" than their

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caregivers did. The results showed acceptable levels of internal consistency of the Finnish version of the CP QOL-Child.

CONCLUSIONS: QOL of children with CP is quite good in Finland. However, barriers to participation and the impact of disability and pain impair QOL. The Finnish version of the CP QOL-Child questionnaire is an appropriate clinical tool to assess QOL.

IMPLICATIONS FOR REHABILITATION: The used questionnaire provides an effective tool to identify areas for targeting support actions and to set goals for rehabilitation plans. The study brings forward the voices of children. It was found that pain has a great role in QOL, which should be taken into account when making rehabilitation plans. The participation of children with CP should be strengthened in every possible ways.

DOI: 10.3109/09638288.2015.1061607

PMID: 26119576 [PubMed - indexed for MEDLINE]

The relationship of dystonia and choreoathetosis with activity, participation and quality of life in children and youth with dyskinetic cerebral palsy.

Monbaliu E, De Cock P, Mailleux L, Dan B, Feys H

Eur J Paediatr Neurol. 2016 Sep 23. pii: S1090-3798(16)30161-1. doi: 10.1016/j.ejpn.2016.09.003. [Epub ahead of print]

AIM: To relate dystonia and choreoathetosis with activity, participation and quality of life (QOL) in children and youth with dyskinetic Cerebral Palsy (CP).

METHODS: Fifty-four participants with dyskinetic CP (mean age 14y6m, SD 4y2m, range 6-22y) were included. The Dyskinesia Impairment Scale (DIS) was used to evaluate dystonia and choreoathetosis. Activity, participation and quality of life (QOL) were assessed with the Gross Motor Function Measure (GMFM), the Functional Mobility Scale (FMS), the Jebsen-Taylor Hand Function Test (JTT), the ABILHAND-Kids Questionnaire (ABIL-K), the Life Habits Kids (LIFE-H) and the Quality of Life Questionnaire for children with CP (CP-QOL). Spearman's rank correlation coefficient (rs) was used to assess the relationship between the movement disorders and activity, participation and QOL measures.

RESULTS: Significant negative correlations were found between dystonia and the activity scales with Spearman's rank correlation coefficient (rs) varying between -0.65 (95% CI = -0.78 to -0.46) and -0.71 (95% CI = -0.82 to -0.55). Correlations were also found with the LIFE-H (rs = -0.43; 95%CI = -0.64 to -0.17) and the CP-QOL (rs = -0.32; 95%CI = -0.56 to -0.03). As far as choreoathetosis is concerned, no or only weak relationships were found with the activity, participation and quality of life scales.

INTERPRETATION: This cross-sectional study is the first to examine the relationship of dystonia and choreoathetosis in dyskinetic CP with the level of activity, participation and QOL. The results revealed dystonia has a higher impact on activity, participation and quality of life than choreoathetosis. These findings seem to suggest it is necessary to first focus on dystonia reducing intervention strategies and secondly on choreoathetosis.

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PMID: 27707657 [PubMed - as supplied by publisher]

📌 Passage à l'âge adulte – Vieillesse

Ageing with cerebral palsy; what are the health experiences of adults with cerebral palsy? A qualitative study.

Mudge S, Rosie J, Stott S, Taylor D, Signal N, McPherson K

BMJ Open. 2016 Oct 13;6(10):e012551. doi: 10.1136/bmjopen-2016-012551.

OBJECTIVE: To enhance understanding of the experiences of ageing with cerebral palsy (CP) in adulthood with a particular focus on experiences with health services.

DESIGN: A qualitative descriptive methodology was applied to capture adults' views of ageing with CP and related interactions with health services. Semistructured interviews were undertaken with data systematically coded and interpreted by grouping information into categories. Themes that encompassed the categories were identified through thematic analysis.

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SETTING: All healthcare settings.

PARTICIPANTS: 28 adults (14 women) with CP, aged 37-70 years.

RESULTS: 5 themes covered the breadth of participants' experiences: (1) acceptance of change; (2) exploring identity: cerebral palsy as only one part of self; (3) taking charge of help; (4) rethinking the future and (5) interacting with health professionals. Being seen and being heard were the features described in positive healthcare interactions. Participants also valued health professionals who reflected on who holds the knowledge?; demonstrated a willingness to learn and respected participants' knowledge and experience.

CONCLUSIONS: Our findings could, and arguably should, inform more responsive strategies for disabled people in health services and, indeed, all health consumers. Our study supports other findings that impairments related to CP change and, for many, severity of disabling impact increases with age. Increased interactions with health and rehabilitation professionals, as a consequence of these changes, have the potential to impact the person's healthcare experience either positively or negatively. A 'listening health professional' may bridge their knowledge gap and, in recognising the person's own expertise, may achieve three things: a more contextualised healthcare intervention; a better healthcare experience for the person with CP and positive impact on the person's sense of autonomy and identity by recognising their expertise. Future research should identify whether this approach improves the healthcare experience for adults living with CP.

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PMID: 27737885 [PubMed - in process]

"Thrust into adulthood": Transition experiences of young adults with cerebral palsy.

Bagatell N, Chan D, Rauch KK, Thorpe D

Disabil Health J. 2016 Oct 3. pii: S1936-6574(16)30136-4. doi: 10.1016/j.dhjo.2016.09.008. [Epub ahead of print]

BACKGROUND: The transition to adulthood, the gradual change in roles and responsibilities, is identified as a challenging time for adolescents and young adults with physical disabilities, including those with cerebral palsy. Health care, education, employment, independent living, and community engagement have been identified as areas of concern. However, relatively little research has been done to understand the experiences, perceptions, and needs of individuals with cerebral palsy as they transition toward adulthood.

OBJECTIVE: The objective of this study was to explore the transition experiences, perceptions, and needs of young adults with cerebral palsy living in one state in the southeastern United States.

METHODS: Focus groups with nine young adults with cerebral palsy (19-34 years) were conducted. The focus group interview explored the preparation for transition and experiences navigating adulthood. The audio-recorded groups were transcribed and analyzed using thematic analysis.

RESULTS: Young adults with cerebral palsy identified numerous challenges associated with navigating adulthood. The main themes were: 1) being thrust into adulthood; 2) navigating systems and services; 3) understanding and managing my body; and 4) dealing with stereotypes and prejudice.

CONCLUSIONS: The findings highlight the need for a holistic approach to transition with a focus on building capacity and empowerment. To navigate complex systems of care, "navigators" or "facilitators" are needed. Additionally, practitioners and service providers in adult systems need further education about cerebral palsy.

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DOI: 10.1016/j.dhjo.2016.09.008

PMID: 27756560 [PubMed - as supplied by publisher]

Prise en charge et Accompagnant/Accompagnement

An evaluation of psychometric properties of caregiver burden outcome measures used in caregivers of children with cerebral palsy: a systematic review protocol.

Dambi JM, Jelsma J, Mlambo T, Chiwaridzo M, Dangarembizi-Munambah N, Corten L

Syst Rev. 2016 Mar 9;5:42. doi: 10.1186/s13643-016-0219-3.

BACKGROUND: Cerebral palsy (CP) is the most common, life-long paediatric disability. Taking care of a child with CP often results in caregiver burden/strain in the long run. As caregivers play an essential role in the rehabilitation of these children, it is therefore important to routinely screen for health outcomes in informal caregivers. Consequently, a plethora of caregiver burden outcome measures have been developed; however, there is a dearth of evidence of the most psychometrically sound tools. Therefore, the broad objective of this systematic review is to evaluate the psychometrical properties and clinical utility of tools used to measure caregiver burden in caregivers of children with CP.

METHODS/DESIGN: This is a systematic review for the evaluation of the psychometric properties of caregiver burden outcome tools. Two independent and blinded reviewers will search articles on PubMed, Scopus, Web of Science, CINAHL, PsychINFO and Africa-Wide Google Scholar. Information will be analysed using predefined criteria. Thereafter, three independent reviewers will then screen the retrieved articles. The methodological quality of studies on the development and validation of the identified tools will be evaluated using the four point COnsensus-based Standards for the selection of health Measurement Instruments (COSMIN) checklist. Finally, the psychometric properties of the tools which were developed and validated from methodological sound studies will then be analysed using predefined criteria.

DISCUSSION: The proposed systematic review will give an extensive review of the psychometrical properties of tools used to measure caregiver burden in caregivers of children with CP. We hope to identify tools that can be used to accurately screen for caregiver burden both in clinical setting and for research purposes.

SYSTEMATIC REVIEW REGISTRATION: PROSPERO CRD42015028026.

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Bridging the gap: the role of Psychiatrists in caring for adults with cerebral palsy.

Cassidy C, Campbell N, Madady M, Payne M

Disabil Rehabil. 2016;38(5):493-8. doi: 10.3109/09638288.2015.1044031. Epub 2015 May 13.

PURPOSE: Individuals with cerebral palsy (CP) experience a significant gap in care as they move from interdisciplinary pediatric programs to limited or non-existent care in the adult sector. A lack of knowledgeable adult care providers has repeatedly been identified as a challenge in transitioning those with CP from pediatric to adult care. The objective of this study was to determine the extent to which Psychiatrists provide care to adults with CP and to identify barriers to their engagement with this population.

METHOD: A survey was distributed to Psychiatrists across Canada. Results were analyzed descriptively using SPSS software.

RESULTS: Most Psychiatrists provide care to very few adults with CP (10 or less), but over 80% feel that Psychiatry is the most appropriate specialty to provide disability-related care to adults with CP following their pediatric discharge. Among the most frequently identified barriers to caring for this population were lack of accessible resources (i.e. social work, funded therapy, equipment) and lack of referrals.

CONCLUSIONS: Psychiatrists are willing and appropriate partners in transitioning patients with CP to adult care. Barriers to Psychiatrists' engagement with this population appear to be amenable to change.

IMPLICATIONS FOR REHABILITATION: A lack of knowledgeable and interested adult practitioners has repeatedly been identified as a challenge in transition planning for young adults with cerebral palsy (the vast majority of whom survive into adulthood). Psychiatrists are ideally suited to manage adults with cerebral palsy, yet in this survey-based study, a majority of Canadian Psychiatrists report caring for less than five adults with cerebral palsy on a regular basis. Barriers to further psychiatric involvement in this population were reported to include lack of accessible resources and lack of referrals.

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Cerebral Palsy: how the child's age and severity of impairment affect the mother's stress and coping strategies.

[Article in English, Portuguese]

Cien Saude Colet. 2016 Oct;21(10):3203-3212. doi: 10.1590/1413-812320152110.17352016.

The aim of the study was to comprehend how the age group and the severity of the motor impairment of children with cerebral palsy modify the mothers' experiences of stress and to understand the coping strategies they use. A qualitative approach was used, with the method framed on Grounded Theory Analysis. Nineteen mothers of children and adolescents with different degrees of motor impairment participated in individual semi-structured interviews. A lack of support and increased time and effort invested in parenting, at the cost of other areas of life threaten participants' physical and emotional health. Mothers of children with mild impairment suffer more from the challenge of dealing with their children's emotional problems, aggression and learning difficulties. For mothers whose children have severe impairment, the major difficulties relate to coping with health complications and functional limitations. Mothers of younger children report diverse sources of stress and scarcity of resources; while mothers of adolescents have greater experience and are able to take up their life projects again. Experience, knowledge and support received are critical for adaptation.

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PMID: 27783793 [PubMed - in process]

Is a family-centred initiative a family-centred service? A case of a Conductive Education setting for children with cerebral palsy.

Schenker R, Parush S, Rosenbaum P, Rigbi A, Yochman A

Child Care Health Dev. 2016 Nov;42(6):909-917. doi: 10.1111/cch.12354. Epub 2016 Jun 9.

BACKGROUND: From the moment a child is diagnosed as having cerebral palsy, families have to cope on a daily basis with the multifaceted challenges of life-long disability management. Family-centred service is embraced as a 'best practice' model because of accumulating evidence supporting its positive influence on parents and children's outcomes. Nevertheless, research comparing parent and provider perspectives on family-centred practices of educational service providers in education settings is scarce. The aims of this study were to compare the extent to which parents and conductors experience the service delivery in Tsad Kadima, the Association for Conductive Education in Israel, as being family-centred, as well as comparing parents' perception of different educational settings as being family-centred.

METHODS: Measurements of family-centeredness, the Israeli Measure of Processes of Care for families (MPOC-20) and for service providers (MPOC-SP), were administrated to 38 teacher conductors and 83 families of children with cerebral palsy (aged 1-14), from different conductive educational settings.

RESULTS: Parents and conductors perceive Conductive Education service as being highly family centred in most domains, rating respectful and supportive care the highest and providing general information the lowest, thus indicating an area where improvements should be made. Parents perceived the service they receive to be more family-centred than conductor's perception about their own activities. In addition, educational setting (day care, pre-school and school) was found to be associated with parent's scores.

CONCLUSIONS: The current study, which is the first to examine family-centred service provision in a conductive special education setting, from the perspectives of both parents and conductors, provides significant evidence for high-quality services in these settings.

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Multidisciplinary rehabilitation for patients with cerebral palsy: improving long-term care.

Trabacca A, Vespino T, Di Liddo A, Russo L

J Multidiscip Healthc. 2016 Sep 22;9:455-462. eCollection 2016.

Cerebral palsy (CP) is one of the most frequent causes of child disability in developed countries. Children with CP need lifelong assistance and care. The current prevalence of CP in industrialized countries ranges from 1.5 to 2.5 per 1,000 live births, with one new case every 500 live births. Children with CP have an almost normal life expectancy and mortality is very low. Despite the low mortality rate, 5%-10% of them die during childhood, especially when the severe motor disability is comorbid with epilepsy and severe intellectual disability. Given this life expectancy,

children with CP present with a lifelong disability of varying severity and complexity, which requires individualized pathways of care. There are no specific treatments that can remediate the brain damage responsible for the complex clinical-functional dysfunctions typical of CP. There are, however, a number of interventions (eg, neurorehabilitation, functional orthopedic surgery, medication, etc) aimed at limiting the damage secondary to the brain insult and improving these patients' activity level and participation and, therefore, their quality of life. The extreme variability of clinical aspects and the complexity of affected functions determine a multifaceted skill development in children with CP. There is a need to provide them with long-term care, taking into account medical and social aspects as well as rehabilitation, education, and assistance. This long-term care must be suited according to children's developmental stage and their physical, psychological, and social development within their life contexts. This impacts heavily on the national health systems which must set up a network of services for children with CP, and it also impacts heavily on the family as a whole, due to the resulting distress, adjustment efforts, and changes in quality of life. This contribution is a narrative review of the current literature on long-term care for children with CP, aiming at suggesting reflections to improve these children's care.

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Domotique - Technology

Physical risk factors influencing wheeled mobility in children with cerebral palsy: a cross-sectional study.

Rodby-Bousquet E, Paleg G, Casey J, Wizert A, Livingstone R

BMC Pediatr. 2016 Oct 10;16(1):165.

BACKGROUND: There is a lack of understanding of the factors that influence independent mobility and participation in meaningful activities. The purpose of this study was to analyse physical factors influencing independent use of manual and power wheelchairs in a total population of children with cerebral palsy (CP).

METHODS: A cross-sectional study based on the most recent examination of all children with CP, born 2002-2013, reported into the Swedish cerebral palsy registry (CPUP), from January 2012 to June 2014. There were 2328 children (58 % boys, 42 % girls), aged 0-11 years, at all levels of gross motor function and hand function. Hazard ratios adjusted for age and sex were used to calculate the risk for not being able to self-propel based on Gross Motor Function Classification System (GMFCS) levels, upper extremity range of motion and hand function including Manual Ability Classification System (MACS), House functional classification system, Thumb-in-palm deformity, Zancolli (spasticity of wrist/finger flexors) and bimanual ability.

RESULTS: In total 858 children used wheelchairs outdoors (692 manual, 20 power, 146 both). Only 10 % of the 838 children self-propelled manual wheelchairs, while 90 % were pushed. In contrast 75 % of the 166 children who used power mobility outdoors were independent. Poor hand function was the greatest risk factor for being unable to self-propel a manual wheelchair, while classification as GMFCS V or MACS IV-V were the greatest risk factors for not being able to use a power wheelchair independently.

CONCLUSIONS: The majority of children with CP, aged 0-11 years did not self-propel manual wheelchairs regardless of age, gross motor function, range of motion or manual abilities. Power mobility should be considered at earlier ages to promote independent mobility for all children with CP who require a wheelchair especially outdoors.

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PMID: 27724880 [PubMed - in process]

Problematic clinical features of children and adults with cerebral palsy who use electric powered indoor/outdoor wheelchairs: A cross-sectional study.

F Assist Technol. 2016 Oct 7:1-8. [Epub ahead of print]

rank AO, De Souza LH.

This article aims to describe the clinical features of electric powered indoor/outdoor wheelchair (EPIOC) users with cerebral palsy (CP) that are problematic to optimal prescription and to explore comorbidities, features of CP, and conditions secondary to disability impacting on equipment provision for children and adults. The method is a cross-sectional study of EPIOC users (n = 102) with a primary diagnosis of CP. This is a retrospective review of electronic and case note records of EPIOC recipients attending a specialist wheelchair service in 2007-2008. Records were reviewed by a rehabilitation consultant. Data were extracted under three themes; demographic, diagnostic/clinical and wheelchair factors. There were 48 males mean age 27.5 (range 8-70, SD 13.9) years and 54 females, mean age 29.5 (range 7-68, SD 14.6) years with CP. Sixteen comorbidities, nine features of CP, and five features of disability influenced wheelchair prescription. Sixty-four users were provided with specialized seating (SS) and 47 with tilt-in-space (TIS) seats. Complex controls were provided to 16 users, 12 tray-mounted. The majority of users had both SS and TIS. Powered wheelchair prescription has important therapeutic roles in clinical management in addition to enhancing mobility, independence and participation. Clinical features such as spasticity and problematic pain appeared less well managed in adults than in children.

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