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## Interventions and Management

### 1. Hand Surg Rehabil. 2016 Apr;35(2):95-9. doi: 10.1016/j.hansur.2015.12.008. Epub 2016 Apr

Robot-assisted C7 nerve root transfer from the contralateral healthy side: A preliminary cadaver study.

Jiang S, Ichihara S, Prunières G, Peterson B, Facca S, Xu WD, Liverneaux P.

Patients with cerebral palsy and spastic hemiplegia may have extremely poor upper extremity function. Unfortunately, many current therapies and treatments for patients with spastic hemiplegia offer very limited improvements. One innovative technique for treating these patients is the use a contralateral C7 nerve root transfer to neurotize the C7 nerve root in the affected limb. This may result not only in less spasticity in the affected limb, but also improved control and motor function vis-a-vis the new connection to the normal cerebral hemisphere. However, contralateral C7 transfers can require large incisions and long nerve grafts. The aim of this study was to test the feasibility of a contralateral C7 nerve root transfer procedure with the use of a prevertebral minimally invasive robot-assisted technique. In a cadaver, both sides of the C7 root were dissected. The right recipient C7 root was resected as proximally as possible, while the left donor C7 root was resected as distally as possible. With the use of the da Vinci (®) SI surgical robot (Intuitive Surgical™, Sunnyvale, CA, USA), we were able to eliminate the large incision and use a much shorter nerve graft when performing contralateral C7 nerve transfer.

[PMID: 27117122](#)

### 2. Dev Med Child Neurol. 2016 Apr 28. doi: 10.1111/dmcn.13119. [Epub ahead of print]

Outcome measures evaluating hand function in children with bilateral cerebral palsy: a systematic review.

Elvrum AG, Saether R, Riphagen II, Vik T.

AIM: To review outcome measures used to evaluate hand function, with emphasis on manual capacity and performance, in children with bilateral cerebral palsy (CP), to describe the content and measurement properties of such measures, and to investigate the quality of the studies that have examined these properties. METHOD: Embase, MEDLINE, PubMed, and CINAHL were searched. The COSMIN-criteria (COnsensus-based Standards for the selection of health Measurement INstruments) were used to assess the quality of studies and the Terwee criteria were used to assess the result of the studies. RESULTS: Five hand function measures were identified from 16 papers. The strongest level of evidence for aspects of validity and reliability was found for the Melbourne Assessment 2, assessing unimanual capacity, and for the questionnaire ABILHAND-Kids, assessing perceived manual ability in daily activities. However, evidence for the responsiveness of these measures is missing. INTERPRETATION: Further high-quality studies providing evidence for responsiveness, as well as for additional aspects of validity and reliability of the Melbourne Assessment 2 and the ABILHAND-Kids, are needed. Furthermore, there is a need to develop appropriate outcome measures evaluating how children with bilateral CP use their hands when handling objects in bimanual tasks.

[PMID: 27121675](#)

**3. BMC Neurol. 2016 Apr 26;16(1):55. doi: 10.1186/s12883-016-0573-8.**

The nutritional state of children and adolescents with cerebral palsy is associated with oral motor dysfunction and social conditions: a cross sectional study.

Pinto VV, Alves LA, Mendes FM, Ciamponi AL.

**BACKGROUND:** Cerebral palsy (CP) is the main cause of severe physical impairment during childhood and has commonly shown oral motor association. It has been considered as the main cause of the high prevalence of problems in children's nutrition. Respiration, chewing, swallowing, speaking and facial expression are part of the orofacial motor functions and when affected they can interfere in children's well-being. The aim of this study was to correlate two methods of orofacial motor evaluation, analyze the influence of orofacial motor functional impairment on the nutritional status of children and adolescents with CP, and the association between socioeconomic factors. **METHODS:** Seventy children and adolescents with CP were selected, age range 6-16 years and following the exclusion criteria previously determined; 129 normoreactive children (control group), sex and age-matched to patients with CP. For the orofacial motor analysis two evaluation instruments were applied, the "Oral Motor Assessment Scale" (OMAS) and "Nordic Orofacial Test-Screening" (NOT-S). The anthropometric evaluation was based on the World Health Organization (WHO) and followed the criteria recommended by the Brazilian Ministry of Health. **RESULTS:** There was statistically significant correlation between the oral motor methods of evaluation ( $r = -0.439$ ,  $p < 0.0001$ ). Concerning the nutritional status evaluation, being overweight was associated with dystonic and mixed CP forms variables ( $p = 0.034$ ), mother with no partnership ( $p = 0.045$ ) and mild oral motor impairment ( $p = 0.028$ ). **CONCLUSION:** It could be concluded that, the weight's gain by children and adolescents might be favored by a better functional oral motor performance and social factors.

[PMID: 27117791](#)

**4. J Electromyogr Kinesiol. 2016 Apr 20;28:130-136. doi: 10.1016/j.jelekin.2016.04.002. [Epub ahead of print]**

The mechanics of activated semitendinosus are not representative of the pathological knee joint condition of children with cerebral palsy.

Ateş F, Temelli Y, Yucesoy CA.

Characteristic cerebral palsy effects in the knee include a restricted joint range of motion and forcefully kept joint in a flexed position. To show whether the mechanics of activated spastic semitendinosus muscle are contributing to these effects, we tested the hypothesis that the muscle's joint range of force exertion is narrow and force production capacity in flexed positions is high. The isometric semitendinosus forces of children with cerebral palsy ( $n=7$ , mean (SD)=7years (8months), GMFCS levels III-IV, 12 limbs tested) were measured intra-operatively as a function of knee angle, from flexion ( $120^\circ$ ) to full extension ( $0^\circ$ ). Peak force measured in the most flexed position was considered as the benchmark. However, peak force (mean (SD)=112.4N (54.3N)) was measured either at intermediate or even full knee extension (three limbs) indicating no narrow joint range of force exertion. Lack of high force production capacity in flexed knee positions (e.g., at  $120^\circ$  negligible or below 22% of the peak force) was shown except for one limb. Therefore, our hypothesis was rejected for a vast majority of the limbs. These findings and those reported for spastic gracilis agree, indicating that the patients' pathological joint condition must rely on a more complex mechanism than the mechanics of individual spastic muscles.

[PMID: 27128957](#)

**5. Dev Med Child Neurol. 2016 Apr 27. doi: 10.1111/dmcn.13142. [Epub ahead of print]**

The effect of muscle endurance and fatigue on participation in adolescents with cerebral palsy.

Kumar R, Smith M.

[PMID: 27116934](#)

**6. J Pediatr Orthop B. 2016 Apr 22. [Epub ahead of print]**

Acetabular and femoral remodeling after varus derotational osteotomy in cerebral palsy: the effect of age and Gross Motor Function Classification Level.

Shore BJ, Powell D, Miller PE, Matheney TH, Snyder BD.

This study investigated the degree of acetabular and femoral remodeling after isolated varus derotation osteotomy (VDRO) in children with cerebral palsy. This retrospective review investigated 56 children (103 hips) who underwent VDROs for spastic hip displacement between 1994 and 2007. The average age of the patients at surgery was 7.7 years and the follow-up duration was 7.8 years (range 5-11 years). The acetabular index showed a significant linear decrease ( $P < 0.001$ ), with children of less than 6 years showing the greatest correction ( $P < 0.001$ ). VDRO without pelvic osteotomy does result in a mild improvement in acetabular dysplasia over time, with greater rates of correction found in children of less than 6 years old.

[PMID: 27111554](#)

**7. Child Care Health Dev. 2016 Apr 26. doi: 10.1111/cch.12341. [Epub ahead of print]**

Parents' perceptions of the services provided to children with cerebral palsy in the transition from preschool rehabilitation to school-based services.

Alsem MW, Verhoef M, Gorter JW, Langezaal LC, Visser-Meily JM, Ketelaar M.

AIM: To describe the course of parents' perceptions of the family centredness of rehabilitation services provided to their children with cerebral palsy (CP) before and after the transition from preschool to school-based services. BACKGROUND: Parents of 59 children with CP aged 2.5 to 4.5 years filled in the 56-item Measure of Processes of Care (MPOC-56) on three occasions pre (2) and post (1) transition to school-based services. Friedman tests were used to describe changes in parents' perceptions over time. Mann-Whitney U tests were used to describe differences in course of parents' perceptions between regular school and special school or day care. RESULTS: Parents' perceptions of preschool services were stable between the ages of 2.5 and 3.5 years, with a decline after transition on four of the five domains of the MPOC ( $P < 0.05$ ). The domain providing general information was scored lowest (median at baseline 3.56, IQR 2.39) compared with the four other MPOC domains, but remained stable over time. No differences in course of parental perceptions were found for school type. CONCLUSION: The transition from preschool to school-based services for children with CP is associated with a decrease in parents' perception of family centredness independent of the type of school. The transition in services has a negative impact on perceived family-centred practices.

[PMID: 27117085](#)

**8. Disabil Rehabil Assist Technol. 2016 Apr 26:1-21. [Epub ahead of print]**

Using assistive robots to promote inclusive education.

Encarnaç o P, Leite T, Nunes C, Nunes da Ponte M, Adams K, Cook A, Caiado A, Pereira J, Piedade G, Ribeiro M.

PURPOSE: This paper describes the development and test of physical and virtual integrated augmentative manipulation and communication assistive technologies (IAMCATs) that enable children with motor and speech impairments to manipulate educational items by controlling a robot with a gripper, while communicating through a speech generating device. METHOD: Nine children with disabilities, nine regular and nine special education teachers participated in the study. Teachers adapted academic activities so they could also be performed by the children with disabilities using the IAMCAT. An inductive content analysis of the teachers' interviews before and after the intervention was performed. RESULTS: Teachers considered the IAMCAT to be a useful resource that can be integrated into the regular class dynamics respecting their curricular planning. It had a positive impact on children with disabilities and on the educational community. However, teachers pointed out the difficulties in managing the class, even with another adult present, due to the extra time required by children with disabilities to complete the activities. CONCLUSIONS: The developed assistive technologies enable children with disabilities to participate in academic activities but full inclusion would require another adult in class and strategies to deal with the additional time required by children to complete the activities. Implications for Rehabilitation Integrated augmentative manipulation and

communication assistive technologies are useful resources to promote the participation of children with motor and speech impairments in classroom activities. Virtual tools, running on a computer screen, may be easier to use but further research is needed in order to evaluate its effectiveness when compared to physical tools. Full participation of children with motor and speech impairments in academic activities using these technologies requires another adult in class and adequate strategies to manage the extra time the child with disabilities may require to complete the activities.

[PMID: 27115833](#)

**9. Int J Lang Commun Disord. 2016 Apr 26. doi: 10.1111/1460-6984.12235. [Epub ahead of print]**

Prevalence of people who could benefit from augmentative and alternative communication (AAC) in the UK: determining the need.

Creer S, Enderby P, Judge S, John A.

**BACKGROUND:** Commissioners and providers require information relating to the number of people requiring a service in order to ensure provision is appropriate and equitable for the population they serve. There is little epidemiological evidence available regarding the prevalence of people who could benefit from augmentative and alternative communication (AAC) in the UK. **AIM:** To determine the prevalence of people who could benefit from AAC in the UK. **METHODS & PROCEDURES:** An epidemiological approach was taken to create a new estimate of need: the prevalence of the main medical conditions and specific symptoms leading to the requirement for AAC were identified from the literature and AAC specialists were consulted to estimate the number of people who may require AAC. **OUTCOMES & RESULTS:** A total of 97.8% of the total number of people who could benefit from AAC have nine medical conditions: dementia, Parkinson's disease, autism, learning disability, stroke, cerebral palsy, head injury, multiple sclerosis and motor neurone disease. The total expectation is that 536 people per 100 000 of the UK population (approximately 0.5%) could benefit from AAC. **CONCLUSIONS & IMPLICATIONS:** To provide accurate figures on the potential need for and use of AAC, data need to be consistently and accurately recorded and regularly reviewed at a community level. The existing data suggest an urgent need for more accurate and up to date information to be captured about the need for AAC in the UK to provide better services and ensure access to AAC strategies, equipment and support.

[PMID: 27113569](#)

**10. J Neurosci Rural Pract. 2016 Apr-Jun;7(2):223-7. doi: 10.4103/0976-3147.178657.**

Caregiver-reported health-related quality of life of children with cerebral palsy and their families and its association with gross motor function: A South Indian study.

Surender S, Gowda VK, Sanjay KS, Basavaraja GV, Benakappa N, Benakappa A.

**INTRODUCTION:** In children, health-related quality of life (HRQOL) includes parental impact and family functioning along with concepts of illness, functional status, mental health, and comfort. We are focusing on the impact of cerebral palsy (CP) on children's HRQOL and their families, and its relationship with gross motor dysfunction. **SUBJECTS AND METHODS:** CP children aged 3-10 years under regular neurology follow-up were enrolled. The HRQOL and motor severity were prospectively assessed using lifestyle assessment questionnaire-CP and gross motor function classification systems, respectively. **RESULTS:** One hundred children participated in this study. Thirty-three percent of children had good, 22% had mildly affected, whereas 45% had moderately to severely affected HRQOL. A significant association is present between gross motor function classification system and HRQOL. **CONCLUSION:** HRQOL in CP and their caregivers is highly impaired. The degree of impairment is associated with physical independence, mobility, clinical burden, and social integration dimensions. Therapies targeting these dimensions and associated comorbidities will improve the HRQOL. Gross motor function classification system is a good indicator of HRQOL.

[PMID: 27114652](#)

## Prevention and Cure

**11. J Paediatr Child Health. 2016 Mar;52(3):253-5. doi: 10.1111/jpc.13142.**

Privacy for neonates: 'All the world loves a baby'.

Badawi N, Keogh JM, Casey A.

[PMID: 27124838](#)

**12. Semin Perinatol. 2016 Apr 22. pii: S0146-0005(16)00015-X. doi: 10.1053/j.semperi.2016.03.007. [Epub ahead of print]**

What we learned about the role of antenatal magnesium sulfate for the prevention of cerebral palsy.

Rouse DJ, Hirtz D; Eunice Kennedy Shriver National Institute of Child Health and Human Development Maternal-Fetal Medicine Units Network.

Based on the convincing case control study of Nelson and Grether which suggested that the administration of magnesium sulfate to mothers prior to early preterm birth might protect their offspring from cerebral palsy, and a pilot study by John Hauth et al. at the University of Alabama at Birmingham, the Eunice Kennedy Shriver National Institute of Child Health and Human Development Maternal-Fetal Medicine Units Network, with co-funding from the National Institute of Neurologic Disorders and Stroke embarked on the Beneficial Effects of Antenatal Magnesium (BEAM) Trial in 1997.

[PMID: 27117179](#)

**13. J Paediatr Child Health. 2016 Mar;52(3):327-32. doi: 10.1111/jpc.13083.**

Developmental outcomes in cerebrospinal fluid proven enteroviral meningitis in neonates > 32 weeks of gestation.

Balasubramanian H, Wagh D, Rao S, Keil AD, McMichael J.

AIM: The aim of this study is to assess the short-term and long-term (1 year) outcomes of cerebrospinal fluid (CSF) confirmed enteroviral meningitis in neonates > 32 weeks of gestation. METHODS: A retrospective audit of neonates admitted between 1 July 2002 to 30 June 2012. RESULTS: Thirty-three neonates were diagnosed with enteroviral meningitis based on a positive CSF enteroviral PCR. Physical growth and neurodevelopmental outcomes at 1 year corrected for prematurity were available for 24 infants. All infants were alive at 1 year. The median weight, length and head circumference at 1 year were in the 72nd, 62nd and 78th centile and were comparable with the birth parameters. The mean general quotient (GQ) was 98.5 (SD 7.1) and was not significantly different from the population mean of 100.2 (P = 0.27). None of the infants had a GQ > 2SD below the population mean. Neurological recovery was complete in the 24 neonates assessed except one, who developed cerebral palsy, epilepsy and progressive hydrocephalus requiring ventriculoperitoneal shunt at 1 year. CONCLUSION: Neonatal enteroviral meningitis was associated with optimal growth and neurodevelopment in the majority of the infants at 1 year corrected for prematurity. Longer term studies are needed to better define developmental outcomes.

[PMID: 27124842](#)

**14. Neuromolecular Med. 2016 Apr 25. [Epub ahead of print]**

Association Between Osteopontin Gene Polymorphisms and Cerebral Palsy in a Chinese Population.

Shang Q, Zhou C, Liu D, Li W, Chen M, Xu Y, Wang F, Bi D, Zhang X, Zhao X, Wang L, Zhu C, Xing Q.

Cerebral palsy (CP) is a neurological disorder affecting movement and posture that develops as a complication of prenatal, perinatal, and postnatal brain injury. Such non-progressive brain injury is often accompanied by neonatal encephalopathy and in-

flammation. The widely expressed soluble cytokine osteopontin (OPN) plays an important role in inflammation and neurological protection. Therefore, it is of great interest to study the relationship between CP and genetic variants of OPN. To explore the genetic association between OPN gene single nucleotide polymorphisms (SNPs) and CP in the Chinese Han population, five SNPs (rs2853744, rs2853749, rs11728697, rs4754, and rs1126616) were genotyped among 715 CP patients and 658 healthy controls using the MassArray platform. Statistical analysis was performed using the online SHESIS program, and Bonferroni correction was applied as necessary. We found an association between rs1126616 and global CP (corrected allelic  $P = 0.0006$  and genotypic  $P = 0.0011$  after Bonferroni correction). The other SNPs were not statistically associated with CP or any of its subgroups. By testing a relatively large sample size, our study demonstrates that the OPN gene SNP rs1126616 is statistically associated with CP. We suspect that the OPN gene might be a susceptibility factor for CP.

[PMID: 27114095](#)

**15. *Pediatr Neurol.* 2016 Mar 17. pii: S0887-8994(15)30327-1. doi: 10.1016/j.pediatrneurol.2016.03.002. [Epub ahead of print]**

Pediatric Cerebral Palsy in Botswana: Etiology, Outcomes, and Comorbidities.

Bearden DR, Monokwane B, Khurana E, Baier J, Baranov E, Westmoreland K, Mazhani L, Steenhoff AP.

**BACKGROUND:** Cerebral palsy is the most common cause of motor dysfunction in children worldwide and is often accompanied by multiple comorbidities. Although cerebral palsy has been studied extensively in high-resource settings, there are few published studies on cerebral palsy etiology, outcomes and comorbidities in low-resource settings. **METHODS:** Children with cerebral palsy were prospectively enrolled from inpatient and outpatient settings at a referral center in Gaborone, Botswana, in a cross-sectional study conducted from 2013 to 2014. Cerebral palsy etiology, outcomes, and comorbidities were determined through caregiver interviews, review of medical records, and direct physical examination. **RESULTS:** Sixty-eight children with cerebral palsy were enrolled. Subjects were 41% male, with a median age of 4 years (interquartile range = 2 to 7). The most common etiologies for cerebral palsy in our cohort were intrapartum hypoxic events (18%), postnatal infections (15%), prematurity (15%), focal ischemic strokes (10%), and prenatal infections (10%). Severe motor impairment was common, with the most severe category present in 41%. The predominant comorbidities were cognitive impairment (84%), epilepsy (77%), and visual impairment (46%). **CONCLUSIONS:** Cerebral palsy in Botswana has different etiologies and is associated with poorer outcomes and higher prevalence of comorbidities than what has been reported in high-resource settings. Further studies are necessary to determine optimal preventative and treatment strategies in this population.

[PMID: 27114082](#)

**16. *Rev Med Brux.* 2016 Jan-Feb;37(1):13-7.**

[Kernicterus in a homebirth baby].

[Article in French]

Dussart A, De Buyst J, Djeunang C, Janssens M, Müller MF, Strebelle E, Mathe K, Infantino S, Malfilâtre G. This is the clinical history of a term baby born at home who presents a severe hyperbilirubinemia. The medical monitoring was assessed by a private midwife according to parental choice. On the third day of life, the newborn presented an icterus and was exposed to natural daylight in the familial greenhouse under the midwife recommendations. On that day, no laboratory test precised the bilirubin level. On the fifth day, a blood sampling revealed a very high blood bilirubinemia (31 mg/dl or 527 mmol/L), the baby is referred to our NICU and underwent an exchange transfusion. The radiological assessment report structural abnormalities in basal ganglia seen on both MRI and transfontannellar echography. These lesions are known to be responsible of cerebral palsy and hearing loss. The neurophysiologic investigations showed background abnormality and depression. The extensive blood sampling excluded haemolysis. The clinical examination brought out neurologic impairment and weight loss in this exclusively breastfed baby. This clinical case point out the increasing risk of home Kernicterus as hospital stays diminish and homebirth enthusiasm rise up. The present clinical situation vouches for an adaptation of care giving to both mother and child at home in order to avoid this severe illness.

[PMID: 27120931](#)