

Monday 6 November 2017

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Interventions and Management

1. Immediate effect of a functional wrist orthosis for children with cerebral palsy or brain injury: A randomized controlled trial.

Jackman M, Novak I, Lannin N, Galea C.

J Hand Ther. 2017 Oct 28. pii: S0894-1130(16)30217-4. doi: 10.1016/j.jht.2017.09.006. [Epub ahead of print]

STUDY DESIGN: Two-group randomized controlled trial. **INTRODUCTION:** Upper limb orthoses worn during functional tasks are commonly used in pediatric neurologic rehabilitation, despite a paucity of high-level evidence. **PURPOSE OF THE STUDY:** The purpose of this study was to investigate if a customized functional wrist orthosis, when placed on the limb, leads to an immediate improvement in hand function for children with cerebral palsy or brain injury. **METHODS:** A 2-group randomized controlled trial involving 30 children was conducted. Participants were randomized to either receive a customized functional wrist orthosis (experimental, n = 15) or not receive an orthosis (control, n = 15). The box and blocks test was administered at baseline and repeated 1 hour after experimental intervention, with the orthosis on if randomized to the orthotic group. **RESULTS:** After intervention, there were no significant differences on the box and blocks test between the orthotic group (mean, 10.13; standard deviation, 11.476) and the no orthotic group (mean, 14.07; standard deviation, 11.106; $t[28]$, -0.954; $P = .348$; and 95% confidence interval, -12.380 to 4.513). **DISCUSSION:** In contrast to the findings of previous studies, our results suggest that a functional wrist orthosis, when supporting the joint in a 'typical' position, may not lead to an immediate improvement in hand function. **CONCLUSIONS:** Wearing a functional wrist orthosis did not lead to an immediate improvement in the ability of children with cerebral palsy or brain injury to grasp and release. Further research is needed combining upper limb orthoses with task-specific training and measuring outcomes over the medium to long term.

[PMID: 29089196](#)

2. Motor performance of individuals with cerebral palsy in a virtual game using a mobile phone.

de Paula JN, de Mello Monteiro CB, da Silva TD, Capelini CM, de Menezes LDC, Massetti T, Tonks J, Watson S, Nicolai Ré AH.

Disabil Rehabil Assist Technol. 2017 Nov 1:1-5. doi: 10.1080/17483107.2017.1392620. [Epub ahead of print]

OBJECTIVES: Cerebral palsy (CP) is a permanent disorder of movement, muscle tone or posture that is caused by damage to the immature and developing brain. Research has shown that Virtual Reality (VR) technology can be used in rehabilitation to support the acquisition of motor skills and the achievement of functional tasks. The aim of this study was to explore for improvements in the performance of individuals with CP with practice in the use of a virtual game on a mobile phone and to compare their performance with that of the control group. **MATERIALS AND METHODS:** Twenty-five individuals with CP were matched for age and sex with twenty-five, typically developing individuals. Participants were asked to complete a VR maze task as fast as possible on a mobile phone. All participants performed 20 repetitions in the acquisition phase, five

repetitions for retention and five more repetitions for transfer tests, in order to evaluate motor learning from the task.

RESULTS: The CP group improved their performance in the acquisition phase and maintained the performance, which was shown by the retention test; in addition, they were able to transfer the performance acquired in an opposite maze path. The CP group had longer task-execution compared to the control group for all phases of the study. **CONCLUSION:** Individuals with cerebral palsy were able to learn a virtual reality game (maze task) using a mobile phone, and despite their differences from the control group, this kind of device offers new possibilities for use to improve function. Implications for rehabilitation A virtual game on a mobile phone can enable individuals with Cerebral Palsy (CP) to improve performance. This illustrates the potential for use of mobile phone games to improve function. Individuals with CP had poorer performance than individuals without CP, but they demonstrated immediate improvements from using a mobile phone device. Individuals with CP were able to transfer their skills to a similar task indicating that they were able to learn these motor skills by using a mobile phone game.

[PMID: 29092683](#)

3. Effectiveness of Virtual Reality in Children With Cerebral Palsy: A Systematic Review and Meta-Analysis of Randomized Controlled Trials.

Chen Y, Fanchiang HD, Howard A.

Phys Ther. 2017 Oct 23. doi: 10.1093/ptj/pzx107. [Epub ahead of print]

BACKGROUND: Researchers recently investigated the effectiveness of virtual reality (VR) in helping children with cerebral palsy (CP) to improve motor function. A systematic review of randomized controlled trials (RCTs) using a meta-analytic method to examine the effectiveness of VR in children with CP was thus needed. **PURPOSE:** The purpose of this study was to update the current evidence about VR by systematically examining the research literature. **DATA SOURCES:** A systematic literature search of PubMed, CINAHL, Cochrane Central Register of Controlled Trials, ERIC, PsycINFO, and Web of Science up to December 2016 was conducted. **STUDY SELECTION:** Studies with an RCT design, children with CP, comparisons of VR with other interventions, and movement-related outcomes were included. **DATA EXTRACTION:** A template was created to systematically code the demographic, methodological, and miscellaneous variables of each RCT. The Physiotherapy Evidence Database (PEDro) was used to evaluate the study quality. Effect size was computed and combined using meta-analysis software. Moderator analyses were also used to explain the heterogeneity of the effect sizes in all RCTs. **DATA SYNTHESIS:** The literature search yielded 19 RCT studies with fair to good methodological quality. Overall, VR provided a large effect size ($d = 0.861$) when compared with other interventions. A large effect of VR on arm function ($d = 0.835$) and postural control ($d = 1.003$) and a medium effect on ambulation ($d = 0.755$) were also found. Only the VR type affected the overall VR effect: an engineer-built system was more effective than a commercial system. **LIMITATIONS:** The RCTs included in this study were of fair to good quality, had a high level of heterogeneity and small sample sizes, and used various intervention protocols. **CONCLUSIONS:** When compared with other interventions, VR seems to be an effective intervention for improving motor function in children with CP.

[PMID: 29088476](#)

4. An independent assessment of reliability of the Melbourne Cerebral Palsy Hip Classification System.

Shrader MW, Koenig AL, Falk M, Belthur M, Boan C.

J Child Orthop. 2017 Oct 1;11(5):334-338. doi: 10.1302/1863-2548.11.170077.

PURPOSE: Neuromuscular (NM) hip dysplasia is common in patients with cerebral palsy (CP). Traditionally, migration percentage (MP) has been used to measure the severity of NM hip dysplasia; however, the MP has some limitations. The purpose of this study is to determine the intra- and inter-reliability of the Melbourne Cerebral Palsy Hip Classification System in the typical paediatric population of patients with CP. **METHODS:** A total of 65 anteroposterior pelvis radiographs in patients (age range 12 years to 21 years) with CP spanning all grades (I to VI) of the classification system were identified and collected for analysis in this institutional review board approved study. Four paediatric orthopaedic surgeons and one orthopaedic surgical resident classified each radiograph according to the Melbourne system. Then, at least four weeks later, the raters repeated the process with a re-randomised order of radiographs. Statistical analysis was performed using the intraclass correlation coefficient (ICC) where < 0 denotes poor agreement and > 0.8 indicates almost perfect agreement. **RESULTS:** The interobserver reliability was found to be excellent with the ICC of 0.853 (0.813 to 0.887) and 0.839 (0.795 to 0.877). The intraobserver reliability was also found to be excellent with the ICC in the range of 0.838 to 0.933 among the raters. Subgroup analysis indicated no differences in the reliability of observers based on clinical experience. **CONCLUSION:** This study

independently demonstrates that the Melbourne Cerebral Palsy Hip Classification System for NM hip dysplasia in patients with CP can be reliably used for communication among various healthcare providers and research and epidemiological purposes.

[PMID: 29081847](#)

5. Avascular necrosis in children with cerebral palsy after reconstructive hip surgery.

Phillips L, Hesketh K, Schaeffer EK, Andrade J, Farr J, Mulpuri K.

J Child Orthop. 2017 Oct 1;11(5):326-333. doi: 10.1302/1863-2548.11.170078.

PURPOSE: Progressive hip displacement is one of the most common orthopaedic pathologies in children with cerebral palsy (CP). Reconstructive hip surgery has become the standard treatment of care. Reported avascular necrosis (AVN) rates for hip reconstructive surgery in these patients vary widely in the literature. The purpose of this study is to identify the frequency and associated risk factors of AVN for reconstructive hip procedures. **METHODS:** A retrospective analysis was performed of 70 cases of reconstructive hip surgery in 47 children with CP, between 2009 and 2013. All 70 cases involved varus derotation osteotomy (VDRO), with 60% having combined VDRO and pelvic osteotomies (PO), and 21% requiring open reductions. Mean age at time of surgery was 8.82 years and 90% of patients were Gross Motor Function Classification System (GMFCS) 4 and 5. Radiographic dysplasia parameters were analysed at selected intervals, to a minimum of one year post-operatively. Severity of AVN was classified by Kruczynski's method. Bivariate statistical analysis was conducted using Chi-square test and Student's t-test. **RESULTS:** There were 19 (27%) noted cases of AVN, all radiographically identifiable within the first post-operative year. The majority of AVN cases (63%) were mild to moderate in severity. Pre-operative migration percentage (MP) ($p = 0.0009$) and post-operative change in MP ($p = 0.002$) were the most significant predictors of AVN. Other risk factors were: GMFCS level ($p = 0.031$), post-operative change in NSA ($p = 0.02$) and concomitant adductor tenotomy (0.028). **CONCLUSION:** AVN was observed in 27% of patients. Severity of displacement correlates directly with AVN risk and we suggest that hip reconstruction, specifically VDRO, be performed early in the 'hip at risk' group to avoid this complication.

[PMID: 29081846](#)

6. Therapeutic effects of kinesio taping in children with cerebral palsy: a systematic review.

[Article in English, Spanish; Abstract available in Spanish from the publisher]

Ortiz Ramírez J, Pérez de la Cruz S.

Arch Argent Pediatr. 2017 Dec 1;115(6):e356-e361. doi: 10.5546/aap.2017.eng.e356.

Pediatric cerebral palsy is a non-progressive neurological disorder. It is one of the most common causes of disability among children. Numerous physical therapy techniques are currently used for treatment, and kinesio taping is one of them. The main objective of this study was to review the outcomes of using kinesio taping in published scientific studies conducted in pediatric patients with cerebral palsy and determine their methodological quality. The main scientific databases and the studies published in the official site of the Asociación Española de Vendaje Neuromuscular (Spanish Association for Neuromuscular Taping) were reviewed. Nine studies were included, which provided important outcomes. These studies show the effectiveness of recovering upper limb and motor function and solving dysphagia, which could be present in these patients, although scientific evidence may expand due to improvements in methodology.

[PMID: 29087112](#)

7. Predictive simulation of surgery effect on cerebral palsy gait.

Galarraga OC, Vigneron V, Khouri N, Dorizzi B, Desailly E.

Comput Methods Biomech Biomed Engin. 2017 Oct;20(sup1):85-86. doi: 10.1080/10255842.2017.1382873.

[No abstract available]

[PMID: 29088672](#)

8. Assessment of the effect of rectus femoris transfer by propensity score matching in cerebral palsy.

Desailly E, Guinet AL, Badina A, Khouri N.

Comput Methods Biomech Biomed Engin. 2017 Oct;20(sup1):61-62. doi: 10.1080/10255842.2017.1382861.

[No abstract available]

[PMID: 29088667](#)

9. Corticoreticular tract lesion in children with developmental delay presenting with gait dysfunction and trunk instability.

Kwon YM, Rose J, Kim AR, Son SM.

Neural Regen Res. 2017 Sep;12(9):1465-1471. doi: 10.4103/1673-5374.215258.

The corticoreticular tract (CRT) is known to be involved in walking and postural control. Using diffusion tensor tractography (DTT), we investigated the relationship between the CRT and gait dysfunction, including trunk instability, in pediatric patients. Thirty patients with delayed development and 15 age-matched, typically-developed (TD) children were recruited. Fifteen patients with gait dysfunction (bilateral trunk instability) were included in the group A, and the other 15 patients with gait dysfunction (unilateral trunk instability) were included in the group B. The Growth Motor Function Classification System, Functional Ambulation Category scale, and Functional Ambulation Category scale were used for measurement of functional state. Fractional anisotropy, apparent diffusion coefficient, fiber number, and tract integrity of the CRT and corticospinal tract were measured. Diffusion parameters or integrity of corticospinal tract were not significantly different in the three study groups. However, CRT results revealed that both CRTs were disrupted in the group A, whereas CRT disruption in the hemispheres contralateral to clinical manifestations was observed in the group B. Fractional anisotropy values and fiber numbers in both CRTs were decreased in the group A than in the group TD. The extents of decreases of fractional anisotropy values and fiber numbers on the ipsilateral side relative to those on the contralateral side were greater in the group B than in the group TD. Functional evaluation data and clinical manifestations were found to show strong correlations with CRT status, rather than with corticospinal tract status. These findings suggest that CRT status appears to be clinically important for gait function and trunk stability in pediatric patients and DTT can help assess CRT status in pediatric patients with gait dysfunction.

[PMID: 29089992](#)

10. Is physical activity of children with cerebral palsy correlated with clinical gait analysis or physical examination parameters?

Guinet AL, Desailly E.

Comput Methods Biomech Biomed Engin. 2017 Oct;20(sup1):99-100. doi: 10.1080/10255842.2017.1382880.

[No abstract available]

[PMID: 29088603](#)

11. How does the ball influence the performance of change of direction and sprint tests in para-footballers with brain impairments? Implications for evidence-based classification in CP-Football.

Reina R, Sarabia JM, Caballero C, Yanci J.

PLoS One. 2017 Nov 3;12(11):e0187237. doi: 10.1371/journal.pone.0187237. eCollection 2017.

The aims of this study were: i) to analyze the reliability and validity of three tests that require sprinting (10 m, 25 m, 40 m), accelerations/decelerations (Stop and Go Test) and change of direction (Illinois Agility Test), with and without ball, in para-

footballers with neurological impairments, and ii) to compare the performance in the tests when ball dribbling is required and to explore the practical implications for evidence-based classification in cerebral palsy (CP)-Football. Eighty-two international para-footballers (25.2 ± 6.8 years; 68.7 ± 8.3 kg; 175.3 ± 7.4 cm; 22.5 ± 2.7 kg·m⁻²), classified according to the International Federation of Cerebral Palsy Football (IFCPF) Classification Rules (classes FT5-FT8), participated in the study. A group of 31 players without CP was also included in the study as a control group. The para-footballers showed good reliability scores in all tests, with and without ball (ICC = 0.53-0.95, SEM = 2.5-9.8%). Nevertheless, the inclusion of the ball influenced testing reproducibility. The low or moderate relationships shown among sprint, acceleration/deceleration and change of direction tests with and without ball also evidenced that they measure different capabilities. Significant differences and large effect sizes ($0.53 < \eta^2 < 0.97$; $p < 0.05$) were found when para-footballers performed the tests with and without dribbling the ball. Players with moderate neurological impairments (i.e. FT5, FT6, and FT7) had higher coefficients of variation in the trial requiring ball dribbling. For all the tests, we also obtained between-group (FT5-FT8) statistical and large practical differences ($\eta^2 = 0.35-0.62$, large; $p < 0.01$). The proposed sprint, acceleration/deceleration and change of direction tests with and without ball may be applicable for classification purposes, that is, evaluation of activity limitation from neurological impairments, or decision-making between current CP-Football classes.

[PMID: 29099836](#)

12. Mechanical muscle and tendon properties of the plantar flexors are altered even in highly functional children with spastic cerebral palsy.

Kruse A, Schranz C, Svehlik M, Tilp M.

Clin Biomech (Bristol, Avon). 2017 Oct 28;50:139-144. doi: 10.1016/j.clinbiomech.2017.10.019. [Epub ahead of print]

BACKGROUND: Recent ultrasound studies found increased passive muscle stiffness and no difference in tendon stiffness in highly impaired children and young adults with cerebral palsy. However, it is not known if muscle and tendon mechanical properties are already altered in highly functional children with cerebral palsy. Therefore, the purpose of this study was to compare the mechanical and material properties of the plantar flexors in highly functional children with cerebral palsy and typically developing children. **METHODS:** Besides strength measurements, ultrasonography was used to assess gastrocnemius medialis and Achilles tendon elongation and stiffness, Achilles tendon stress, strain, and Young's modulus in twelve children with cerebral palsy (GMFCS levels I and II) and twelve typically developing peers during passive dorsiflexion rotations as well as maximum voluntary contractions. **FINDINGS:** Despite no difference in ankle joint stiffness ($P > 0.05$) between groups, passive but not active Achilles tendon stiffness was significantly decreased (-39%) and a tendency of increased passive muscle stiffness was observed even in highly functional children with cerebral palsy. However, material properties of the tendon were not altered. Maximum voluntary contraction showed reduced plantar flexor strength (-48%) in the cerebral palsy group. **INTERPRETATION:** Even in children with mild spastic cerebral palsy, muscle and tendon mechanical properties are altered. However, it appears that the Achilles tendon stiffness is different only when low forces act on the tendon during passive movements. Although maximum voluntary force is already decreased, forces acting on the Achilles tendon during activity appear to be sufficient to maintain typical material properties.

[PMID: 29100187](#)

13. Identification, classification and assessment of dyskinesia in children with cerebral palsy: A survey of clinicians.

Stewart K, Tavender E, Rice J, Harvey A.

J Paediatr Child Health. 2017 Oct 31. doi: 10.1111/jpc.13749. [Epub ahead of print]

AIM: The aims of this study were to investigate clinicians' knowledge, and barriers they perceive exist, relating to the identification and measurement of dyskinesia (dystonia/choreoathetosis) in children with cerebral palsy (CP) and to explore educational needs regarding improving identification and assessment of dyskinesia. **METHODS:** This was a cross-sectional online survey of clinicians working with children with CP. Data analysis was descriptive, with qualitative analysis of unstructured questions. **RESULTS:** In total, 163 completed surveys from Australian clinicians were analysed. Respondents were allied health ($n = 140$) followed by medical doctors ($n = 18$) working mainly in tertiary hospitals and not-for-profit organisations. Hypertonia subtypes and movement disorders seen in children with CP appear to be identified by clinicians, although limited knowledge about dyskinesia and access to training were reported as significant barriers to accurate identification. Despite knowledge of available measurement scales, only a small percentage were used clinically and reported to be only somewhat useful or not useful at all. Barriers identified for use of scales included limited training opportunities and knowledge of scales and lack of confidence in their use. **CONCLUSION:** A lack of confidence in identifying and measuring

movement disorders in children with CP was reported by Australian clinicians. It was identified that a greater understanding of dyskinetic CP and the tools available to identify and measure it would be valuable in clinical practice. The results of this survey will inform the development of a 'Toolbox' to help identify, classify and measure dyskinetic CP and its impact on activity and participation using the framework of the International Classification of Functioning, Disability and Health.

[PMID: 29090508](#)

14. Improving multilevel surgery planning and predicting post-operative outcome in cerebral palsy.

Desailly E, Galarraga OC, Khouri N.

Comput Methods Biomech Biomed Engin. 2017 Oct;20(sup1):59-60. doi: 10.1080/10255842.2017.1382860.

[No abstract available]

[PMID: 29088668](#)

15. Prognosis following dental implant treatment under general anesthesia in patients with special needs.

Kim IH, Kuk TS, Park SY, Choi YS, Kim HJ, Seo KS.

J Dent Anesth Pain Med. 2017 Sep;17(3):205-213. doi: 10.17245/jdamp.2017.17.3.205. Epub 2017 Sep 25.

BACKGROUND: This study retrospectively investigated outcomes following dental implantation in patients with special needs who required general anesthesia to enable treatment. **METHODS:** Patients underwent implant treatment under general anesthesia at the Clinic for the Disabled in Seoul National University Dental Hospital between January 2004 and June 2017. The study analyzed medical records and radiographs. Implant survival rates were calculated by applying criteria for success or failure. **RESULTS:** Of 19 patients in the study, 8 were males and 11 were females, with a mean age of 32.9 years. The patients included 11 with mental retardation, 3 with autism, 2 with cerebral palsy, 2 with schizophrenia, and 1 with a brain disorder; 2 patients also had seizure disorders. All were incapable of oral self-care due to serious cognitive impairment and could not cooperate with normal dental treatment. A total of 27 rounds of general anesthesia and 1 round of intravenous sedation were performed for implant surgery. Implant placement was performed in 3 patients whose prosthesis records could not be found, while 3 other patients had less than 1 year of follow-up after prosthetic treatment. When the criteria for implant success or failure were applied in 13 remaining patients, 3 implant failures occurred in 59 total treatments. The cumulative survival rate of implants over an average of 43.3 months (15-116 months) was 94.9%. **CONCLUSIONS:** For patients with severe cognitive impairment who are incapable of oral self-care, implant treatment under general anesthesia showed a favorable prognosis.

[PMID: 29090251](#)

16. Parent-child discrepancy in the assessment of health-related quality of life using the EQ-5D-Y questionnaire.

[Article in English, Spanish; Abstract available in Spanish from the publisher]

Perez Sousa MÁ, Olivares Sánchez-Toledo PR, Gusi Fuerte N.

Arch Argent Pediatr. 2017 Dec 1;115(6):541-546. doi: 10.5546/aap.2017.eng.541.

INTRODUCTION: The assessment of health-related quality of life (HRQoL) serves to detect changes over time in patients' health status and allows to do a cost-effectiveness analysis of treatments. When children with special health features cannot perform a self-assessment, it is possible to assess their HRQoL through their parents or caregivers. To date, the discrepancy in the assessment of HRQoL using the EQ-5D-Y questionnaire among children with cerebral palsy (CP) and their parents has not been analyzed. The objective of this study was to analyze the level of agreement in the HRQoL assessment using the EQ-5D-Y questionnaire and its proxy version among children with CP and their parents or caregivers. **POPULATION AND METHODS:** Children and adolescents with CP, and their parents, from a special education school in the region of Extremadura (Spain) participated in the study. The EQ-5D-Y questionnaire was used for children and the EQ-5D-Y proxy version, for parents.

Interviews were conducted in the first quarter of 2015. The level of agreement in the responses was analyzed using the Cohen's kappa coefficient for the five domains of the EQ-5D-Y and the intraclass correlation coefficient for the visual analogue scale. RESULTS: Sixty-two children with CP and mild and/or moderate functional capacity impairment, and their parents, participated in the study. The level of agreement was poor in the HRQoL assessment between children and parents in all the questionnaire domains (<0.20) and fair or poor (<0.60) in the visual analogue scale. CONCLUSIONS: A high level of parent-child disagreement was observed in the HRQoL assessment in the population with CP using the EQ-5D-Y questionnaire.

[PMID: 29087107](#)

Prevention and Cure

17. Effect of Autologous Cord Blood Infusion on Motor Function and Brain Connectivity in Young Children with Cerebral Palsy: A Randomized, Placebo-Controlled Trial.

Sun JM, Song AW, Case LE, Mikati MA, Gustafson KE, Simmons R, Goldstein R, Petry J, McLaughlin C, Waters-Pick B, Chen LW, Wease S, Blackwell B, Worley G, Troy J, Kurtzberg J.

Stem Cells Transl Med. 2017 Oct 28. doi: 10.1002/scrm.17-0102. [Epub ahead of print]

Cerebral palsy (CP) is a condition affecting young children that causes lifelong disabilities. Umbilical cord blood cells improve motor function in experimental systems via paracrine signaling. After demonstrating safety, we conducted a Phase II trial of autologous cord blood (ACB) infusion in children with CP to test whether ACB could improve function (ClinicalTrials.gov, NCT01147653; IND 14360). In this double-blind, placebo-controlled, crossover study of a single intravenous infusion of 1.5×10^7 total nucleated cells per kilogram of ACB, children ages 1 to 6 years with CP were randomly assigned to receive ACB or placebo at baseline, followed by the alternate infusion 1 year later. Motor function and magnetic resonance imaging brain connectivity studies were performed at baseline, 1, and 2 years post-treatment. The primary endpoint was change in motor function 1 year after baseline infusion. Additional analyses were performed at 2 years. Sixty-three children (median age 2.1 years) were randomized to treatment ($n = 32$) or placebo ($n = 31$) at baseline. Although there was no difference in mean change in Gross Motor Function Measure-66 (GMFM-66) scores at 1 year between placebo and treated groups, a dosing effect was identified. In an analysis 1 year post-ACB treatment, those who received doses $\geq 2 \times 10^7$ /kg demonstrated significantly greater increases in GMFM-66 scores above those predicted by age and severity, as well as in Peabody Developmental Motor Scales-2 Gross Motor Quotient scores and normalized brain connectivity. Results of this study suggest that appropriately dosed ACB infusion improves brain connectivity and gross motor function in young children with CP. Stem Cells Translational Medicine 2017.

[PMID: 29080265](#)

18. Timing of administration of antenatal magnesium sulfate and umbilical cord blood magnesium levels in preterm babies.

Reynolds A, Slattery S, Byrne S, Neary E, Müllers S, Kent E, Malone FD, El-Khuffash A, McGarvey C, Hayes BC.

J Matern Fetal Neonatal Med. 2017 Oct 29:1-141. doi: 10.1080/14767058.2017.1398724. [Epub ahead of print]

BACKGROUND: The optimum timing of administration of magnesium sulfate ($MgSO_4$) in relation to delivery is not known. The general consensus is to achieve administration to the mother at least 4 hours prior to preterm delivery. OBJECTIVE: To investigate potential predictors of umbilical cord blood magnesium (Mg) concentrations, in particular timing of antenatal $MgSO_4$ administration in relation to delivery. STUDY DESIGN: A prospective observational study of infants delivered at less than 32 weeks' gestational age. Cord bloods samples were collected at delivery and Mg levels analyzed. RESULTS: Of the 81 included cases, 5 received no antenatal $MgSO_4$, 65 received a 4 g bolus only, and 11 received a 4 g bolus and 1 g/hour infusion. The median time of bolus administration before delivery was 104 minutes (IQR: 57-215). The mean magnesium level was 0.934 mmol/L in the No Antenatal $MgSO_4$ Group, 1.018 mmol/L in the Bolus Only Group, and 1.225 mmol/L in the Bolus and Infusion Group ($p < 0.05$). In the Bolus Only Group, the highest mean magnesium concentration (1.091 mmol/L) was achieved with administration 1-2 hours before delivery, but the difference was small and not statistically significant. On multiple regression analysis, lower birthweight Z scores and gestational age were independently associated with higher cord blood Mg levels. CONCLUSION: In the Bolus Only Group, the highest mean Mg levels were observed with administration 1-2

hours before delivery, but the findings was not statistically significant. Compared to rest of the cohort, higher Mg levels were found when a bolus was followed by an infusion. Following a MgSO₄ bolus, some growth restricted extremely preterm babies may have higher Mg levels than would be otherwise expected.

[PMID: 29082790](#)

19. Antenatal magnesium for preterm delivery reduces risk of cerebral palsy among surviving very preterm infants.

Paulsen ME, Dietz RM.

Acta Paediatr. 2017 Oct 30. doi: 10.1111/apa.14116. [Epub ahead of print]

[No abstract available]

[PMID: 29083069](#)

20. Novel Findings in Obstetric Brachial Plexus Palsy: A Study of Corpus Callosum Volumetry and Resting-State Functional Magnetic Resonance Imaging of Sensorimotor Network.

Kislay K, Devi BI, Bhat DI, Shukla DP, Gupta AK, Panda R.

Neurosurgery. 2017 Oct 28. doi: 10.1093/neuros/nyx495. [Epub ahead of print]

BACKGROUND: The response of the brain to obstetric brachial plexus palsy (OBPP) is not clearly understood. We propose that even a peripheral insult at the developmental stage may result in changes in the volume of white matter of the brain, which we studied using corpus callosum volumetry and resting-state functional magnetic resonance imaging (rsfMRI) of sensorimotor network. **OBJECTIVE:** To study the central neural effects in OBPP. **METHODS:** We performed an MRI study on a cohort of 14 children who had OBPP and 14 healthy controls. The mean age of the test subjects was 10.07 ± 1.22 yr (95% confidence interval). Corpus callosum volumetry was compared with that of age-matched healthy subjects. Hofer and Frahm segmentation was used. Resting-state fMRI data were analyzed using the FSL software (FMRIB Software Library v5.0, Oxford, United Kingdom), and group analysis of the sensorimotor network was performed. **RESULTS:** Statistical analysis of corpus callosum volume revealed significant differences between the OBPP cohort and healthy controls, especially in the motor association areas. Independent t-test revealed statistically significant volume loss in segments I (prefrontal), II (premotor), and IV (primary sensory area). rsfMRI of sensorimotor network showed decreased activation in the test hemisphere (the side contralateral to the injured brachial plexus) and also decreased activation in the ipsilateral hemisphere, when compared with healthy controls. **CONCLUSION:** OBPP occurs in an immature brain and causes central cortical changes. There is secondary corpus callosum atrophy which may be due to retrograde transneuronal degeneration. This in turn may result in disruption of interhemispheric coactivation and consequent reduction in activation of sensorimotor network even in the ipsilateral hemisphere.

[PMID: 29092081](#)

21. Severe neurodevelopmental disability and healthcare needs among survivors of medical and surgical necrotizing enterocolitis: A prospective cohort study.

Fullerton BS, Hong CR, Velazco CS, Mercier CE, Morrow KA, Edwards EM, Ferrelli KR, Soll RF, Modi BP, Horbar JD, Jaksic T.

J Pediatr Surg. 2017 Oct 12. pii: S0022-3468(17)30651-6. doi: 10.1016/j.jpedsurg.2017.10.029. [Epub ahead of print]

PURPOSE: This study characterizes neurodevelopmental outcomes and healthcare needs of extremely low birth weight (ELBW) survivors of necrotizing enterocolitis (NEC) compared to ELBW infants without NEC. **METHODS:** Data were collected prospectively on neonates born 22-27 weeks' gestation or 401-1000g at 47 Vermont Oxford Network member centers from 1999 to 2012. Detailed neurodevelopmental evaluations were conducted at 18-24 months corrected age. Information regarding rehospitalizations, postdischarge surgeries, and feeding was also collected. "Severe neurodevelopmental disability" was defined as: bilateral blindness, hearing impairment requiring amplification, inability to walk 10 steps with support, cerebral

palsy, and/or Bayley Mental or Psychomotor Developmental Index <70. Diagnosis of NEC required both clinical and radiographic findings. RESULTS: There were 9063 children without NEC, 417 with medical NEC, and 449 with surgical NEC evaluated. Significantly higher rates of morbidity were observed among infants with a history of NEC. Those with surgical NEC were more frequently affected across all outcome measures at 18-24months corrected age: 38% demonstrated severe neurodevelopmental disability, nearly half underwent postdischarge operations, and a quarter required tube feeding at home. CONCLUSION: At 18-24months, extremely low birth weight survivors of necrotizing enterocolitis were at markedly increased risk ($p<0.001$) for severe neurodevelopmental disability, postdischarge surgery, and tube feeding. LEVEL OF EVIDENCE: II (prospective cohort study with <80% follow-up rate).

[PMID: 29079317](#)