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## Interventions and Management

1. *BMC Pediatr.* 2015 Sep 16;15(1):124. doi: 10.1186/s12887-015-0442-4.

**Association between gross motor function and postural control in sitting in children with Cerebral Palsy: a correlational study in Spain.**

Montero Mendoza S, Gómez-Conesa A, Hidalgo Montesinos MD.

**BACKGROUND:** Cerebral palsy (CP) is one of the causes of physical disability in children. Sitting abilities can be described using the Level of Sitting Scale (LSS) and the Gross Motor Function Classification System (GMFCS). There is growing interest in the sitting posture of children with CP owing to a stable sitting position allows for the development of eye-hand coordination, functions of the upper extremities and functional skills. Besides, in recent years researchers have tried to develop a new terminology to classify the CP as performed by the Surveillance of Cerebral Palsy in Europe (SCPE), in order to improve the monitoring of the frequency of the CP, providing a framework for research and service planning. The aim of this study was to analyse the relationship between GMFCS and LSS. The second purpose was to describe how the SCPE relates to sitting abilities with the GMFCS and LSS. **METHODS:** The study involved 139 children with CP (range 3-18 years) from 24 educational centres. Age, gender, CP classification according to SCPE, GMFCS and LSS levels were recorded by an experienced physiotherapist. **RESULTS:** A significant inverse relationship between GMFCS and LSS score levels was found ( $r_s = -0.86$ ,  $p = 0.00$ ). 45.3 % of the children capable of leaning in any direction and of re-erecting the trunk (level VIII on the LSS) could walk without limitation (level I on the GMFCS). There were differences in the distribution of the GMFCS ( $\chi^2(4):50.78$ ) and LSS ( $\chi^2(7): 37.15$ ) levels and CP according to the distribution of the spasticity ( $p < 0.01$ ). **CONCLUSIONS:** There was a negative correlation between both scales and a relation between sitting ability and the capacity to walk with or without technical devices. GMFCS and the LSS are useful tools for describing the functional abilities and limitations of children with CP, specially sitting and mobility. Classification based on the distribution of spasticity and the gross motor function provides clinical information on the prognosis and development of children with CP.

[PMID: 26376627](#)

2. *J Pediatr Orthop.* 2015 Sep 11. [Epub ahead of print]

**A Modification to the McHale Procedure Reduces Operative Time and Blood Loss.**

Godfrey J1, McGraw J, Kallur A, Silva S, Szalay E.

**BACKGROUND:** Treatment of symptomatic spastic hip dislocations in adolescent patients with cerebral palsy

includes a variety of described salvage type procedures. In 1990, McHale and colleagues described a technique involving a femoral head resection, valgus-producing proximal femoral osteotomy, and advancement of the lesser trochanter into the acetabulum. We have modified this technique in 3 ways by: performing it in the lateral position with a more posterior approach, not advancing the lesser trochanter into the acetabulum, and closing the capsule over the acetabulum. The purpose of this paper is to describe our technique and to compare the results to Castle type procedures and McHale procedures performed as originally described. **METHODS:** We retrospectively reviewed all salvage type procedures performed at our institution for spastic hip dislocations in children with cerebral palsy from 2003 to 2013. Preoperative and postoperative pain, estimated blood loss, operative time, length of stay in the hospital, and postoperative pelvis radiographs were reviewed for heterotopic ossification formation and proximal femoral migration. **RESULTS:** Twenty-six patients with 30 hip procedures were reviewed. The modified McHale technique had shorter operative times when compared with the supine McHale technique and the Castle procedure (134, 171, and 139 min, respectively). There was a trend toward less blood loss in the modified McHale technique, but this was not significant. There was no difference in length of stay in the hospital. The majority of McHale patients (>63%) had pain relief postoperatively, where half of the Castle patients required a revision surgery for pain (4 of 8). There was less heterotopic ossification seen in the modified McHale technique (6.25%) when compared with supine McHale and Castle techniques (both 50%). However, there was more proximal femoral migration in the modified McHale group. **CONCLUSIONS:** The modified McHale technique is faster with otherwise equivocal results in the immediate operative periods. There is less heterotopic bone formation but more proximal femoral migration with this new technique. **LEVEL OF EVIDENCE:** Level IV-case series.

[PMID: 26368855](#)

**3. Clin Biomech (Bristol, Avon). 2015 Sep 8. pii: S0268-0033(15)00242-9. doi: 10.1016/j.clinbiomech.2015.09.001. [Epub ahead of print]**

**Does muscle coactivation influence joint excursions during gait in children with and without hemiplegic cerebral palsy? Relationship between muscle coactivation and joint kinematics.**

Gross R, Leboeuf F, Hardouin JB, Perrouin-Verbe B, Brochard S, Rémy-Néris O.

**BACKGROUND:** The theoretical role of muscle coactivation is to stiffen joints. The aim of this study was to assess the relationship between muscle coactivation and joint excursions during gait in children with and without hemiplegic cerebral palsy. **METHODS:** Twelve children with hemiplegic cerebral palsy and twelve typically developing children underwent gait analysis at three different gait speeds. Sagittal hip, knee, and ankle kinematics were divided into their main components corresponding to joint excursions. A coactivation index was calculated for each excursion from the electromyographic envelopes of the rectus femoris/semitendinosus, vastus medialis/semitendinosus, or tibialis anterior/soleus muscles. Mixed linear analyses of covariance modeled joint excursions as a function of the coactivation index and limb. **FINDINGS:** In typically developing children, increased coactivation was associated with reduced joint excursion for 8 of the 14 linear models (hip flexion, knee loading, knee extension in stance, knee flexion in swing, ankle plantarflexion from initial contact to foot-flat, ankle dorsiflexion in stance and in swing). Conversely, ankle plantarflexion excursion at push-off increased with increasing tibialis anterior/soleus coactivation. In the involved limbs of the children with cerebral palsy, knee loading, ankle plantarflexion at push off, and ankle dorsiflexion in swing decreased, while hip extension increased, with increasing muscle coactivation. **INTERPRETATION:** The relationships between muscle coactivation and joint excursion were not equally distributed in both groups, and predominant in typically developing children. The results suggest that excessive muscle coactivation is not a cause of stiff-knee gait in children with hemiplegic cerebral palsy, but appears to be related to spastic drop foot.

[PMID: 26377949](#)

**4. Gait Posture. 2015 Aug 28. pii: S0966-6362(15)00812-7. doi: 10.1016/j.gaitpost.2015.08.006. [Epub ahead of print]**

**Influence of orthosis on the foot progression angle in children with spastic cerebral palsy.**

Danino B, Erel S, Kfir M, Khamis S, Batt R, Hemo Y, Wientroub S, Hayek S.

We retrospectively assessed the effect of ankle-foot orthosis (AFO) on the foot progression angle (FPA) of 97 children with spastic cerebral palsy (CP) who had undergone comprehensive computer-based gait analysis both barefoot and with their orthosis, during the same session. The physical examination results and the gait study temporal and kinematic parameters comprise the study data. We focused on the peak FPA reached during stance and swing phases and at mid-stance and mid-swing, and also measured the transverse rotations of the pelvis, the femur and the tibia. AFOs improved gait, as reflected by improved temporal parameters, but they also increased internal rotation of the feet in diplegic CP children by 4.29 degrees for mid-stance, and by 3.72 degrees for mid-swing. The correlation between components of the rotational profile and FPA was significant for the diplegic group. AFOs did not produce any noteworthy differences between walking barefoot and walking with the brace in the hemiplegic group in what concerns FPA. Children with diplegic CP who use AFOs walk with increased internal FPAs in their orthoses. These findings might be explained by anatomical attributes as well as dynamic features during gait.

[PMID: 26371829](#)

**5. Am J Phys Med Rehabil. 2015 Sep 11. [Epub ahead of print]**

**Effects of Induced Volitional Fatigue on Sprint and Jump Performance in Paralympic Athletes with Cerebral Palsy.**

Runciman P, Tucker R, Ferreira S, Albertus-Kajee Y, Derman W.

**OBJECTIVE:** This study investigated performance, neuromuscular characteristics, and fatigue in Paralympic athletes with cerebral palsy (CP) during a maximal explosive performance trial, compared with well-trained, sprint-specific able-bodied athletes. **DESIGN:** Six Paralympic athletes with hemiplegic CP and 12 able-bodied athletes performed one 40-m sprint test (in seconds) and Vertical Jump Tests off both legs (in centimeters), the affected leg individually (in centimeters), and the nonaffected leg individually (in centimeters) before and after an adapted Multistage Shuttle Run Test to exhaustion. Electromyography of five bilateral muscles was measured for mean amplitude (percentage maximum activation). **RESULTS:** The 40-m sprint test, Vertical Jump Test off both legs, and Vertical Jump Test off the affected leg were significantly compromised in the CP group, whereas the Vertical Jump Test off the nonaffected leg was similar between groups ( $P < 0.05$ ). Both groups fatigued similarly in performance and electromyography. Affected side electromyography was higher than nonaffected electromyography in the Vertical Jump Test off both legs and Vertical Jump Test off the affected leg in both groups. **CONCLUSIONS:** The similarity in fatigue between CP and able-bodied groups confirms that Paralympic athletes with CP may have overcome deficits associated with CP documented in sedentary children. The identified asymmetry may assist with a deeper understanding of performance deficits in CP, as it is indicated that activity generated by both legs is performed toward the capacity of the affected leg.

[PMID: 26368834](#)

**6. Med Sci Sports Exerc. 2015 Oct;47(10):2076-83. doi: 10.1249/MSS.0000000000000653.**

**Sedentary and Active Time in Toddlers with and without Cerebral Palsy.**

Oftedal S, Bell KL, Davies PS, Ware RS, Boyd RN.

**INTRODUCTION/PURPOSE:** To evaluate differences in sedentary time and compare levels of physical activity and sedentary behavior to the Australian physical activity recommendations between toddlers with cerebral palsy (CP) according to functional capacity (Gross Motor Function Classification System [GMFCS]) and age-matched children

with typical development (CTD). METHODS: Children ( $2.4 \pm 0.5$  yr old) were split into CTD ( $n = 20$ ), GMFCS I-II ( $n = 32$ ), GMFCS III ( $n = 14$ ), and GMFCS IV-V ( $n = 12$ ) groups and wore a triaxial ActiGraph® for 3 d. Validated cut points were applied to identify sedentary and active time and the number and duration of sedentary bouts and breaks for each group. Analysis of variance (ANOVA) with post hoc testing, chi-square analysis, and the Fisher exact test were used to compare groups. RESULTS: No difference between the CTD group (49%) and GMFCS I-II group (52%) was found for sedentary time as a percentage of wear time. The GMFCS III group was more sedentary than both these groups (62%,  $P < 0.05$ ). The GMFCS IV-V group was more sedentary than all the other groups (74%,  $P < 0.05$ ). The CTD group and GMFCS I-II group was more likely to spend 180 min or longer in active play on all 3 d than the GMFCS IV-V group ( $P < 0.05$ ). The GMFCS IV-V group was more likely to have sedentary bouts  $\geq 60$  min or longer than all other groups ( $P < 0.05$ ). CONCLUSION: Differences in sedentary behavior between the CTD and mildly impaired children with CP (GMFCS I-II) are not evident in the toddler years. Children with moderate-to-severe functional impairment are progressively more sedentary and less likely to meet physical activity guidelines. Further research into the health implications of high levels of sedentary behavior in toddlers is required.

[PMID: 26378944](#)

## 7. Minerva Pediatr. 2015 Sep 11. [Epub ahead of print]

### The effect of vitamin D auxiliary rehabilitation therapy in children with cerebral palsy and language dysfunction.

Zhu X, Jiao R, Tu M, Wang W, Wen X, Song B.

OBJECTIVE: To observe the clinical efficacy of vitamin D auxiliary rehabilitation therapy in children with cerebral palsy and language dysfunction. METHODS: Eighty-two cases of children with cerebral palsy and language dysfunction in our hospital from March 2011 to June 2014 were selected for this study. They were divided into two groups: the rehabilitation treatment group (simple group, 39 cases) and the vitamin D auxiliary rehabilitation therapy group (combination group, 43 cases). After three months of treatment, language development, Gesell Child Development Scale, Bayley Infant Development Scale score and vitamin D and calcium levels were compared. RESULTS: The language development, Gesell Child Development Scale, Bayley Infant Development Scale score and vitamin D and calcium levels for two of the groups, after treatment, are improved compared to before treatment. The difference was statistically significant ( $P < 0.05$ ). The total efficiency of the language development in the combination group was obviously higher than the simple group. The difference was significant (95.3% vs. 74.4%,  $X^2 = 2.486$ ,  $P = 0.032$ ). The Gesell Child Development Scale improved in the combination group compared to the simple group. The difference was statistically significant [ $(70.4 \pm 11.3)$  vs  $(53.3 \pm 10.5)$ ,  $t = 3.127$ ,  $P = 0.026$ ]. The proportion of normal children was significantly higher than the rehabilitation treatment group, and the difference was statistically significant (30.2% vs. 20.5%,  $X^2 = 3.016$ ,  $P = 0.029$ ). In the combination group, the vitamin D and calcium levels were statistically increased compared to the rehabilitation treatment group. It had statistical differences between the two groups ( $P < 0.05$ ). CONCLUSION: Vitamin D auxiliary rehabilitation therapy could improve the language function and the language development status in children with cerebral palsy and language dysfunction.

[PMID: 26365823](#)

## 8. J Speech Lang Hear Res. 2015 Sep 17. doi: 10.1044/2015\_JSLHR-S-14-0365. [Epub ahead of print]

### Variability and diagnostic accuracy of speech intelligibility scores in children.

Hustad KC, Oakes A, Allison K.

Purpose: We examined variability of speech intelligibility scores and how well intelligibility scores predicted group membership among 5 year old children with speech motor impairment (SMI) secondary to cerebral palsy (CP) and an age-matched group of typically developing (TD) children. Method: Speech samples varying in length from 1-4 words were elicited from 24 children with CP (mean age 60.5 months) and 20 TD children (mean age 60.33 months). Two-hundred twenty adult listeners made orthographic transcriptions of speech samples ( $n = 5$  per child).

Results: Variability associated with listeners made a significant contribution to explaining the variance in intelligibility scores for TD and SMI children, but the magnitude was greater for TD children. Intelligibility scores differentiated very well between children who have SMI and TD children when intelligibility was at or below approximately 75% and above approximately 85%. Conclusions: Intelligibility seems to be a useful clinical tool for differentiating between TD children and children with SMI at 5 years of age; however, there is considerable variability within and between listeners highlighting the need for more than one listener per child to ensure validity of an intelligibility measure.

[PMID: 26381119](#)

#### **9. Am J Case Rep. 2015 Sep 18;16:631-636.**

##### **Ataxia-Telangiectasia Presenting as Cerebral Palsy and Recurrent Wheezing: A Case Report.**

Navratil M, Đuranović V, Nogalo B, Švigir A, Dumbović Dubravčić I, Turkalj M.

**BACKGROUND** Ataxia-telangiectasia (A-T) is an autosomal recessive disease that consists of progressive cerebellar ataxia, variable immunodeficiency, sinopulmonary infections, oculocutaneous telangiectasia, radiosensitivity, early aging, and increased incidence of cancer. **CASE REPORT** We report the case of an 8-year-old boy affected by A-T. At 12 months of age, he had a waddling gait, with his upper body leaning forward. Dystonic/dyskinetic cerebral palsy was diagnosed at the age of 3 years. At age 6 he was diagnosed with asthma based on recurrent wheezing episodes. A-T was confirmed at the age 8 years on the basis of clinical signs and laboratory findings (increased alpha fetoprotein - AFP, immunodeficiency, undetectable ataxia-telangiectasia mutated (ATM) protein on immunoblotting, and identification A-T mutation, 5932G>T). **CONCLUSIONS** The clinical and immunological presentation of ataxia-telangiectasia (A-T) is very heterogeneous and diagnostically challenging, especially at an early age, leading to frequent misdiagnosis.

[PMID: 26380989](#)

#### **10. Augment Altern Commun. 2015 Sep 15:1-11. [Epub ahead of print]**

##### **Eina! Ouch! Eish! Professionals' Perceptions of How Children with Cerebral Palsy Communicate About Pain in South African School Settings: Implications for the use of AAC.**

Johnson E, Nilsson S, Adolfsson M.

Most children with severe cerebral palsy experience daily pain that affects their school performance. School professionals need to assess pain in these children, who may also have communication difficulties, in order to pay attention to the pain and support the children's continued participation in school. In this study, South African school professionals' perceptions of how they observed pain in children with cerebral palsy, how they questioned them about it and how the children communicated their pain back to them were investigated. Thirty-eight school professionals participated in five focus groups. Their statements were categorized using qualitative content analysis. From the results it became clear that professionals observed children's pain communication through their bodily expressions, behavioral changes, and verbal and non-verbal messages. Augmentative and alternative communication (AAC) methods were rarely used. The necessity of considering pain-related vocabulary in a multilingual South African context, and of advocating for the use of AAC strategies to enable children with cerebral palsy to communicate their pain was highlighted in this study.

[PMID: 26372118](#)

11. *J Bone Joint Surg Am.* 2015 Sep 16;97(18):1482-94. doi: 10.2106/JBJS.O.00179.

**Computerized Adaptive Tests Detect Change Following Orthopaedic Surgery in Youth with Cerebral Palsy.**

Mulcahey MJ, Slavin MD, Ni P, Vogel LC, Kozin SH, Haley SM, Jette AM.

**BACKGROUND:** The Cerebral Palsy Computerized Adaptive Test (CP-CAT) is a parent-reported outcomes instrument for measuring lower and upper-extremity function, activity, and global health across impairment levels and a broad age range of children with cerebral palsy (CP). This study was performed to examine whether the Lower Extremity/Mobility (LE) CP-CAT detects change in mobility following orthopaedic surgery in children with CP. **METHODS:** This multicenter, longitudinal study involved administration of the LE CP-CAT, the Pediatric Outcomes Data Collection Instrument (PODCI) Transfer/Mobility and Sports/Physical Functioning domains, and the Timed "Up & Go" test (TUG) before and after elective orthopaedic surgery in a convenience sample of 255 children, four to twenty years of age, who had CP and a Gross Motor Function Classification System (GMFCS) level of I, II, or III. Standardized response means (SRMs) and 95% confidence intervals (CIs) were calculated for all measures at six, twelve, and twenty-four months following surgery. **RESULTS:** SRM estimates for the LE CP-CAT were significantly greater than the SRM estimates for the PODCI Transfer/Mobility domain at twelve months, the PODCI Sports/Physical Functioning domain at twelve months, and the TUG at twelve and twenty-four months. When the results for the children at GMFCS levels I, II, and III were grouped together, the improvements in function detected by the LE CP-CAT at twelve and twenty-four months were found to be greater than the changes detected by the PODCI Transfer/Mobility and Sports/Physical Functioning scales. The LE CP-CAT outperformed the PODCI scales for GMFCS levels I and III at both of these follow-up intervals; none of the scales performed well for patients with GMFCS level II. **CONCLUSIONS:** The results of this study showed that the LE CP-CAT displayed superior sensitivity to change than the PODCI and TUG scales after musculoskeletal surgery in children with CP.

[PMID: 26378264](#)

12. *Clin Rehabil.* 2015 Sep 13. pii: 0269215515604699. [Epub ahead of print]

**A pilot single-blind multicentre randomized controlled trial to evaluate the potential benefits of computer-assisted arm rehabilitation gaming technology on the arm function of children with spastic cerebral palsy.**

Preston N, Weightman A, Gallagher J, Levesley M, Mon-Williams M, Clarke M, O'Connor RJ.

**OBJECTIVE:** To evaluate the potential benefits of computer-assisted arm rehabilitation gaming technology on arm function of children with spastic cerebral palsy. **DESIGN:** A single-blind randomized controlled trial design. Power calculations indicated that 58 children would be required to demonstrate a clinically important difference. **SETTING:** Intervention was home-based; recruitment took place in regional spasticity clinics. **PARTICIPANTS:** A total of 15 children with cerebral palsy aged five to 12 years were recruited; eight to the device group. **INTERVENTIONS:** Both study groups received 'usual follow-up treatment' following spasticity treatment with botulinum toxin; the intervention group also received a rehabilitation gaming device. **MAIN MEASURES:** ABILHAND-kids and Canadian Occupational Performance Measure were performed by blinded assessors at baseline, six and 12 weeks. **RESULTS:** An analysis of covariance showed no group differences in mean ABILHAND-kids scores between time points. A non-parametric analysis of variance on Canadian Occupational Performance Measure scores showed a statistically significant improvement across time points ( $\chi^2(2,15) = 6.778, p = 0.031$ ), but this improvement did not reach minimal clinically important difference. Mean daily device use was seven minutes. Recruitment did not reach target owing to unanticipated staff shortages in clinical services. Feedback from children and their families indicated that the games were not sufficiently engaging to promote sufficient use that was likely to result in functional benefits. **CONCLUSION:** This study suggests that computer-assisted arm rehabilitation gaming does not benefit arm function, but a Type II error cannot be ruled out.

[PMID: 26370148](#)

13. *Eur J Obstet Gynecol Reprod Biol.* 2015 Sep 1. pii: S0301-2115(15)00273-0. doi: 10.1016/j.ejogrb.2015.08.012. [Epub ahead of print]

**Dantrolene an unusual option for detrusor overactivity: observations of a patient with cerebral palsy.**

Bulchandani S, Toozs-Hobson P, Kennedy A, Sturman S.

We report a case of a 49-year-old female with cerebral palsy with spastic tri-plegia and lumbar spondylolisthesis diagnosed to have overactive neurogenic bladder, which improved on treatment with Dantrolene along with antimuscarinics. She was initially treated with antimuscarinics both transdermal and oral simultaneously and later received intravesical OnaBotulinum toxinA. Following lumbar spine fixation for spondylolisthesis, her bowel and bladder function deteriorated and she was commenced on Dantrolene for her spasticity, along with being on Oxybutinin and Mirabegron. This significantly improved her symptoms. Overactive bladder symptoms are a common manifestation in cases of CP. In refractory cases where antimuscarinics and intravesical botulinum toxin therapy have failed, a combination of Dantrolene with antimuscarinics and/or beta 3 receptor agonists may prove to be beneficial. While on therapy, regular monitoring of liver functions is required to promptly diagnose and treat hepatotoxicity.

[PMID: 26365833](#)

## Prevention and Cure

14. *BMC Pediatr.* 2015 Sep 16;15(1):123. doi: 10.1186/s12887-015-0439-z.

**PPREMO: a prospective cohort study of preterm infant brain structure and function to predict neurodevelopmental outcome.**

George JM, Boyd RN, Colditz PB, Rose SE, Pannek K, Fripp J, Lingwood BE, Lai MM, Kong AH, Ware RS, Coulthard A, Finn CM, Bandaranayake SE.

**BACKGROUND:** More than 50 percent of all infants born very preterm will experience significant motor and cognitive impairment. Provision of early intervention is dependent upon accurate, early identification of infants at risk of adverse outcomes. Magnetic resonance imaging at term equivalent age combined with General Movements assessment at 12 weeks corrected age is currently the most accurate method for early prediction of cerebral palsy at 12 months corrected age. To date no studies have compared the use of earlier magnetic resonance imaging combined with neuromotor and neurobehavioural assessments (at 30 weeks postmenstrual age) to predict later motor and neurodevelopmental outcomes including cerebral palsy (at 12-24 months corrected age). This study aims to investigate i) the relationship between earlier brain imaging and neuromotor/neurobehavioural assessments at 30 and 40 weeks postmenstrual age, and ii) their ability to predict motor and neurodevelopmental outcomes at 3 and 12 months corrected age. **METHODS/DESIGN:** This prospective cohort study will recruit 80 preterm infants born  $\leq$ 30 week's gestation and a reference group of 20 healthy term born infants from the Royal Brisbane & Women's Hospital in Brisbane, Australia. Infants will undergo brain magnetic resonance imaging at approximately 30 and 40 weeks postmenstrual age to develop our understanding of very early brain structure at 30 weeks and maturation that occurs between 30 and 40 weeks postmenstrual age. A combination of neurological (Hammersmith Neonatal Neurologic Examination), neuromotor (General Movements, Test of Infant Motor Performance), neurobehavioural (NICU Network Neurobehavioural Scale, Premie-Neuro) and visual assessments will be performed at 30 and 40 weeks postmenstrual age to improve our understanding of the relationship between brain structure and function. These data will be compared to motor assessments at 12 weeks corrected age and motor and neurodevelopmental outcomes at 12 months corrected age (neurological assessment by paediatrician, Bayley scales of Infant and Toddler Development, Alberta Infant Motor Scale, Neurosensory Motor Developmental Assessment) to differentiate atypical development (including cerebral palsy and/or motor delay). **DISCUSSION:** Earlier identification of those very preterm infants at risk of adverse neurodevelopmental and motor outcomes provides an additional period for intervention to optimise outcomes. **TRIAL REGISTRATION:** Australian New Zealand Clinical Trials Registry ACTRN12613000280707 . Registered 8 March 2013.

[PMID: 26377791](#)