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## Interventions and Management

### 1. *Adapt Phys Activ Q.* 2016 Jul;33(3):271-82. doi: 10.1123/APAQ.2015-0115.

The Effects of Acute Intense Physical Exercise on Postural Stability in Children With Cerebral Palsy.

Leineweber MJ, Wyss D, Dufour SK, Gane C, Zabjek K, Bouyer LJ, Maltais DB, Voisin JI, Andrysek J.

This study evaluated the effects of intense physical exercise on postural stability of children with cerebral palsy (CP). Center of pressure (CoP) was measured in 9 typically developing (TD) children and 8 with CP before and after a maximal aerobic shuttle-run test (SRT) using a single force plate. Anteroposterior and mediolateral sway velocities, sway area, and sway regularity were calculated from the CoP data and compared between pre- and postexercise levels and between groups. Children with CP demonstrated significantly higher pre-SRT CoP velocities than TD children in the sagittal ( $18.6 \pm 7.6$  vs.  $6.75 \pm 1.78$  m/s) and frontal planes ( $15.4 \pm 5.3$  vs.  $8.04 \pm 1.51$  m/s). Post-SRT, CoP velocities significantly increased for children with CP in the sagittal plane ( $27.0 \pm 1.2$  m/s), with near-significant increases in the frontal plane ( $25.0 \pm 1.5$  m/s). Similarly, children with CP evidenced larger sway areas than the TD children both pre- and postexercise. The diminished postural stability in children with CP after short but intense physical exercise may have important implications including increased risk of falls and injury.

[PMID: 27623610](#)

### 2. *J Physiother.* 2016 Aug 2. pii: S1836-9553(16)30039-X. doi: 10.1016/j.jphys.2016.07.003. [Epub ahead of print]

Adding parent-delivered therapy does not improve upper limb function more than repeated practice alone in children with cerebral palsy [synopsis].

Shields N.

Summary of: Kirkpatrick E, Pearse J, James P, Basu A. Effect of parent-delivered action observation therapy on upper limb function in unilateral cerebral palsy: a randomized controlled trial. *Dev Med Child Neuro* 2016; doi: 10.1111/dmcn.13109

[PMID: 27634161](#)

**3. J Physiother. 2016 Aug 1. pii: S1836-9553(16)30037-6. doi: 10.1016/j.jphys.2016.07.001. [Epub ahead of print]**

Adding parent-delivered therapy does not improve upper limb function more than repeated practice alone in children with cerebral palsy [commentary].

Johnston LM.

Caregiver involvement in therapy is important for children with cerebral palsy, and parents have emphasised that: Home programs are a form of guidance and advice [that help] parents maximise their child's potential [and] build confidence about how to help their child.<sup>1</sup> However, the most effective involvement of caregivers in the therapeutic process is poorly understood.<sup>2</sup> Kirkpatrick et al contribute evidence to family-centred practice by using a well-designed, pragmatic, effectiveness trial set in the home environment.

[PMID: 27634167](#)

**4. J Phys Ther Sci. 2016 Aug;28(8):2220-6. doi: 10.1589/jpts.28.2220. Epub 2016 Aug 31.**

The effects of hippotherapy on postural balance and functional ability in children with cerebral palsy.

Moraes AG, Copetti F, Angelo VR, Chiavoloni LL, David AC.

[Purpose] This study evaluated the effects of hippotherapy on seated postural balance, dynamic balance, and functional performance in children with cerebral palsy and compared the effects of 12 and 24 sessions on seated postural balance. [Subjects and Methods] This study included 15 children with cerebral palsy aged between 5 and 10 years. INTERVENTIONS: A hippotherapy protocol was performed for 30 minutes, twice a week, for 12 weeks. Postural balance in a sitting position was measured using an AMTI AccuSway Plus force platform 1 week before initiating the hippotherapy program and after 12 and 24 weeks. The Berg Balance Scale (BBS) and Pediatric Evaluation of Disability Inventory (PEDI) were used before and after 24 sessions. [Results] Significant differences were observed for center of pressure (COP) variables, including medio-lateral (COPml), anteroposterior displacement (COPap), and velocity of displacement (VelCOP), particularly after 24 sessions. There were also significant differences in BBS scores and PEDI score increases associated with functional skills (self-care, social function, and mobility), caregiver assistance (self-care), social function, and mobility. [Conclusion] Hippotherapy resulted in improvement in postural balance in the sitting position, dynamic balance, and functionality in children with cerebral palsy, an effect particularly significant after 24 hippotherapy sessions.

[PMID: 27630401](#)

**5. Am J Phys Med Rehabil. 2016 Sep 14. [Epub ahead of print]**

A Randomized Controlled Trial on Effectiveness of Intermittent Serial Casting on Spastic Equinus Foot in Children with Cerebral Palsy After Botulinum Toxin-A Treatment.

Dursun N, Gokbel T, Akarsu M, Dursun E.

OBJECTIVE: Physical therapy (PT) and botulinum toxin-A (BTX-A) injections are widely used in the treatment of spastic equinus foot due to cerebral palsy. The aim of this study was to show effects of intermittent serial casting (SC) in addition to standard treatment on spasticity, passive range of motion (PROM), and gait. DESIGN: Fifty-one ambulatory patients, treated by BTX-A to plantar flexor muscles, were randomly assigned to casting or control groups in a 2:1 ratio. Both groups received PT for 3 weeks. Casting group additionally received intermittent SC during 3 consecutive weekends. Assessments included Modified Ashworth Scale (MAS), Tardieu Scale, Observational Gait Scale (OGS), and Physician Global Assessment at baseline and posttreatment weeks 4 and 12. RESULTS: Significant improvements in PROM, MAS, Tardieu Scale, and OGS were recorded in both groups ( $P < 0.001$  for all). Average changes in MAS, PROM, angle of catch, spasticity angle, and OGS of the casting group were significantly higher than those of the controls at week 4 ( $P = 0.006$ ,  $P = 0.002$ ,  $P < 0.001$ ,  $P = 0.005$ ,  $P = 0.011$ ), and 12 ( $P = 0.013$ ,  $P < 0.001$ ,  $P < 0.001$ ,  $P = 0.011$ ,  $P < 0.001$ ). Follow-up Physician Global Assessment also favored casting group ( $P < 0.001$  for both). CONCLUSIONS: Combining intermittent SC with BTX-A injections and PT might provide additional benefits for spastic equinus foot.

[PMID: 27631386](#)

**6. Dev Med Child Neurol. 2016 Sep 16. doi: 10.1111/dmcn.13283. [Epub ahead of print]**

Improving functional outcomes for children with unilateral cerebral palsy: the quest for the right intervention.

Bos AF.

[No abstract available]

[PMID: 27634212](#)

**7. J Phys Ther Sci. 2016 Aug;28(8):2414-7. doi: 10.1589/jpts.28.2414. Epub 2016 Aug 31.**

Change in functional balance after an exercise program with Nintendo Wii in Latino patients with cerebral palsy: a case series.

Gatica-Rojas V, Cartes-Velásquez R, Méndez-Rebolledo G, Olave-Godoy F, Villalobos-Rebolledo D.

[Purpose] This study aimed to explore the possibility of improving functional balance using an exercise program with Nintendo and the Balance Board peripheral in subjects with cerebral palsy. [Subjects and Methods] This study included 4 male outpatients of a neurological center. All participants received an exercise program based on the use of Nintendo with the Balance Board peripheral. Training consisted of three 25-min sessions per week for 6 weeks. Each session was guided by a physical therapist. Timed up-and-go and one-leg standing tests were conducted before and after the intervention. [Results] All subjects showed significant improvements in the results of the timed up-and-go test. However, there were no significant changes in the results of the one-leg standing test. [Conclusion] The exercise protocol involving Nintendo with the Balance Board peripheral appears to improve functional dynamic balance in patients with cerebral palsy. However, static functional balance does not improve after 6 weeks of training.

[PMID: 27630446](#)

**8. Mymensingh Med J. 2016 Jul;25(3):421-4.**

Effects of Intensive versus Non-Intensive Physical Therapy on Children with Cerebral Palsy.

Rahman MA, Zaman MM, Rahman MM, Moniruzzaman M, Ahmed B, Chhobi FK, Rahman N, Akter MR.

Cerebral Palsy (CP) is one of the most common causes of all childhood disorders. There are tone, posture and movements difficulty due to non-progressive damage to the immature brain in CP. The hallmark of CP is a disability in the development of gross motor function (GMF). The influence of gross motor development on fine motor development is more important in early developmental period, specially under three years old and in children with CP. Various therapeutic interventions have been used in the management of GMF development. Among them physical therapy is the most common intervention in CP and is usually a component of mandated programs. Physical therapy means physical stimulations in the form of various therapeutic exercises, touch, massage, limbs and trunk movement, balancing and coordination training, gait and ambulation training, cognitive stimulation as well as speech, language and occupational therapy. Our study focused to see the effect by short term intensive versus non-intensive physical therapy on children GMF development by using gross motor function measure (GMFM) Score sheet, GMFM-88, version 1.0. Study provides the information that physical therapy intervention is effective in GMF development and intensive interventions are more effective in children with spastic CP than non-intensive one. Study also inform that the more early treatment the more effective result.

[PMID: 27612885](#)

**9. Prosthet Orthot Int. 2016 Sep 9. pii: 0309364616665731. [Epub ahead of print]**

Gastrocnemius operating length with ankle foot orthoses in cerebral palsy.

Choi H, Wren TA, Steele KM.

**BACKGROUND:** Many individuals with cerebral palsy wear ankle foot orthoses during daily life. Orthoses influence joint motion, but how they impact muscle remains unclear. In particular, the gastrocnemius is commonly stiff in cerebral palsy. Understanding whether orthoses stretch or shorten this muscle during daily life may inform orthosis design and rehabilitation. **OBJECTIVES:** This study investigated the impact of different ankle foot orthoses on gastrocnemius operating length during walking in children with cerebral palsy. **STUDY DESIGN:** Case series, within subject comparison of gastrocnemius operating length while walking barefoot and with two types of ankle foot orthoses. **METHODS:** We performed gait analyses for 11 children with cerebral palsy. Each child was fit with two types of orthoses: a dynamic ankle foot orthosis (Cascade dynamic ankle foot orthosis) and an adjustable dynamic response ankle foot orthosis (Ultraflex ankle foot orthosis). Musculoskeletal modeling was used to quantify gastrocnemius musculotendon operating length and velocity with each orthosis. **RESULTS:** Walking with ankle foot orthoses could stretch the gastrocnemius more than barefoot walking for some individuals; however, there was significant variability between participants and orthoses. At least one type of orthosis stretched the gastrocnemius during walking for 4/6 and 3/5 of the Gross Motor Functional Classification System Level I and III participants, respectively. AFOs also reduced peak gastrocnemius lengthening velocity compared to barefoot walking for some participants, with greater reductions among the Gross Motor Functional Classification System Level III participants. Changes in gastrocnemius operating length and lengthening velocity were related to changes in ankle and knee kinematics during gait. **CONCLUSION:** Ankle foot orthoses impact gastrocnemius operating length during walking and, with proper design, may assist with stretching tight muscles in daily life. **CLINICAL RELEVANCE:** Determining whether ankle foot orthoses stretch tight muscles can inform future orthotic design and potentially provide a platform for integrating therapy into daily life. However, stretching tight muscles must be balanced with other goals of orthoses such as improving gait and preventing bone deformities.

[PMID: 27613590](#)

**10. Disabil Rehabil. 2016 Sep 16:1-9. [Epub ahead of print]**

An exploratory study of gait and functional outcomes after neuroprosthesis use in children with hemiplegic cerebral palsy.

Bailes AF, Caldwell C, Clay M, Tremper M, Dunning K, Long J.

**PURPOSE:** To evaluate the immediate orthotic, total and therapeutic effects of functional electrical stimulation (FES) neuroprosthesis use on clinic based measures of gait and function in children with hemiplegic cerebral palsy. **METHODS:** Eleven children (mean 9 years 11 months) participated in an FES neuroprosthesis (Ness L300) intervention (4 week accommodation period followed by 12 weeks of daily use) and were assessed at baseline and post in stimulation off and stimulation on conditions. Measures included clinic based outcomes of gait and function. **RESULTS:** No significant immediate orthotic effects were observed. Significant ( $p < 0.01$ ) total effects were noted for dorsiflexion at initial contact, Six-Minute Walk Test (6MWT), and walking speed. A significant therapeutic effect was found for steps off path on the Standardized Walking Obstacle Course (SWOC). **CONCLUSIONS:** Results support previous findings of neuroprosthesis total effects on gait and provide some evidence for effects on function. Therapeutic effects remain unclear. **Implications for Rehabilitation** In this study, children with hemiplegic CP did not demonstrate immediate improvements in gait or function at their first clinic visit using the FES neuroprosthesis device suggesting one visit using the device is not sufficient to determine potential benefits. Over time with daily use of the FES neuroprosthesis, ankle dorsiflexion in swing and at initial contact, walking speed and endurance increased with the device worn. Overtime, no carryover effects in ankle dorsiflexion in swing and at initial contact were noted at the end of the intervention period with the device off. Clinicians should consider purchasing units to loan or rent to individuals to trial a device at home before determining long-term potential for benefit.

[PMID: 27636551](#)

**11. Res Dev Disabil. 2016 Sep 11;59:194-201. doi: 10.1016/j.ridd.2016.08.012. [Epub ahead of print]**

Construct validity and responsiveness of Movakic: An instrument for the evaluation of motor abilities in children with severe multiple disabilities.

Mensch SM, Echteld MA, Evenhuis HM, Rameckers EA.

Movakic is a newly developed instrument for measurement of motor abilities in children with severe multiple disabilities, with a satisfactory feasibility and content validity and good inter-observer and test-retest reliability. The objective of this study was to investigate its construct validity and responsiveness to change. Sixty children with severe multiple disabilities (mean age 7.7 years, range 2-16) were measured using Movakic six times during 18 months. Construct validity was assessed by correlating Movakic scores with expert judgment. In order to assess responsiveness, scores during 3-months intervals were compared (mean score-changes and intraclass correlations) during which some children experienced meaningful events influencing motor abilities and during which others experienced no such event. Forty-five percent of children had a lower cognitive development level than 6-month, 52% had Gross Motor Function Classification System level V and 37% had level IV. For 27 children all measurements were completed, six children dropped out. Construct validity was good ( $r=0.50-0.71$ ). Responsiveness was demonstrated by significantly larger score changes after events than when such events did not occur. Movakic is a valid instrument for measuring motor abilities in children with severe multiple disabilities. Results suggest responsiveness to change in motor abilities after meaningful events.

[PMID: 27627682](#)

**12. Eur J Phys Rehabil Med. 2016 Aug;52(4):560-74.**

Gait analysis: clinical facts.

Baker R1, Esquenazi A, Benedetti MG, Desloovere K.

Gait analysis is a well-established tool for the quantitative assessment of gait disturbances providing functional diagnosis, assessment for treatment planning, and monitoring of disease progress. There is a large volume of literature on the research use of gait analysis, but evidence on its clinical routine use supports a favorable cost-benefit ratio in a limited number of conditions. Initially gait analysis was introduced to clinical practice to improve the management of children with cerebral palsy. However, there is good evidence to extend its use to patients with various upper motor neuron diseases, and to lower limb amputation. Thereby, the methodology for properly conducting and interpreting the exam is of paramount relevance. Appropriateness of gait analysis prescription and reliability of data obtained are required in the clinical environment. This paper provides an overview on guidelines for managing a clinical gait analysis service and on the principal clinical domains of its application: cerebral palsy, stroke, traumatic brain injury and lower limb amputation.

[PMID: 27618499](#)

**13. J Phys Ther Sci. 2016 Aug;28(8):2279-83. doi: 10.1589/jpts.28.2279. Epub 2016 Aug 31.**

Correlation between the gross motor performance measurement and pediatric balance scale with respect to movement disorder in children with cerebral palsy.

Kwon HY, Ahn SY.

[Purpose] To determine whether the Gross Motor Performance Measurement is useful in predicting the future score of the Pediatric Balance Scale, this study examined the correlation between the 2 measurement tools with respect to movement disorder in children with cerebral palsy. [Subjects and Methods] A total of 38 study subjects with cerebral palsy were divided into 3 groups (spastic, dyskinetic, and ataxic) by means of systematic proportional stratified sampling in accordance with the characteristics of their movement disorders. [Results] The spastic Pediatric Balance Scale had an intermediate level of positive correlation with dissociated movement ( $r=0.411$ ), alignment ( $r=0.518$ ), and weight shift ( $r=0.461$ ). The dyskinetic Pediatric Balance Scale had a strong positive correlation with dissociated movement ( $r=0.905$ ), coordination ( $r=0.882$ ), alignment ( $r=0.930$ ), and stability ( $r=0.924$ ). The ataxic Pediatric Balance Scale had an intermediate level of positive correlation with the

overall Gross Motor Performance Measurement ( $r=0.636$ ), and a strong positive correlation with dissociated movement ( $r=0.866$ ), coordination ( $r=0.871$ ) and stability ( $r=0.984$ ). [Conclusion] Gross Motor Performance Measurement is important in evaluating the quality of movement, and can be considered an excellent supplementary tool in predicting functional balance.

[PMID: 27630414](#)

#### **14. Motor Control. 2016 Aug 19:1-23. [Epub ahead of print]**

The Effect of Vestibular Stimulation on Motor Functions of Children With Cerebral Palsy.

Tramontano M, Medici A, Iosa M, Chiariotti A, Fusillo G, Manzari L, Morelli D.

**BACKGROUND:** Cerebral palsy (CP) has been defined as a non-progressive disease of movement and posture development. Physical therapy techniques use different forms of sensory stimulation to improve neuromotor development. **AIM:** The aim of this study was to assess the efficacy of a vestibular stimulation training in improving motor functions in cerebral palsy. **POPULATION:** Fourteen children with CP were randomly separated into two different groups in a cross-over trial. **METHODS:** Over a period of 10 weeks, each group performed 10 sessions of 50 minutes of neurodevelopmental treatment (NDT) and 10 sessions of vestibular training (VR). Children were evaluated with the Gross Motor Function Measurement-88 scale, the Goal Attainment Scale and the root mean square of head accelerations. **RESULTS:** A significant improvement in the GAS-score ( $p=0.003$ ) was noted after NDT+VR. **CONCLUSIONS:** Vestibular stimulation integrated with NDT proved to be an effective complementary strategy for facilitating motor functioning.

[PMID: 27633076](#)

#### **15. J Phys Ther Sci. 2016 Aug;28(8):2293-8. doi: 10.1589/jpts.28.2293. Epub 2016 Aug 31.**

Using health games for rehabilitation of patients with infantile cerebral palsy.

Lee WC, Reyes-Fernández MC, Posada-Gómez R, Juárez-Martínez U, Martínez-Sibaja A, Alor-Hernández G.

[Purpose] The purposes of this study were to evaluate whether the therapeutic games developed by the study team are significantly effective for upper limb rehabilitation of patients with cerebral palsy and to assess the development of the games and the evolution of patients throughout the therapy sessions. [Subjects and Methods] This study demonstrates the results of using therapeutic games in patients with infantile cerebral palsy. The therapies were performed in 30-minute sessions for about 1 to 4 months. This study shows the progress of five children with cerebral palsy during the sessions. The time it took the children on each road and the times required to complete a task were measured. In addition, the level of difficulty of the games was gradually increased at each session. [Results] Results have shown good progress on the accuracy of the movements and an increase in concentration level during the execution of the games, showing an improvement in the patients' performance by 40-55% faster. [Conclusions] Health games encourage children to comply with therapy. The advantage of the game is that the patient can perform the therapy at home, which could help achieve further progress in patients.

[PMID: 27630417](#)

#### **16. J Pediatr Nurs. 2016 Sep 12. pii: S0882-5963(16)30251-2. doi: 10.1016/j.pedn.2016.08.005. [Epub ahead of print]**

Predictive Factors for Inpatient Falls among Children with Cerebral Palsy.

Alemdaroğlu E, Özbudak SD, Mandiroğlu S, Biçer SA, Özgirgin N, Uçan H.

Inpatient falls are of significant concern. The aim of this prospective study was to determine the predictors of inpatient falls among children with cerebral palsy in a rehabilitation hospital. **DESIGN AND METHODS:** A total of 93 patients with cerebral palsy were assessed based on history, physical findings, the Selective Motor Control Test, the Gross Motor Functional Classification System, the Berg Balance Scale and the Manual Ability Classification System. Previous history of falls/frequent falls, and any falls which occurred during hospitalization, were recorded. **RESULTS:** Of all 93 patients, 25 (27%) fell and 68 (73%) did not fall. The mean age of the fallers ( $6.3\pm 2.0$  years) was lower than that of the non-fallers ( $8.1\pm 3.9$  years).

Behavioral problems according to the mother's statement (OR 26.454), not being able to maintain a long sitting position (OR 10.807), ability to balance on knees without support (OR 9.810), a history of frequent falls (OR 4.893) and a negative Thomas test (OR 4.192 fold) were found to increase the risk of inpatient falls. **CONCLUSIONS:** In these children with cerebral palsy, behavioral problems according to the mother's statement, a history of frequent falls, not being able to maintain a long sitting position, a negative Thomas test, and able to balance on knees without support were associated with the risk of inpatient falls. Children with cerebral palsy may experience inpatient falls. Further studies are required in order to develop prevention programs. **PRACTICE IMPLICATIONS:** For patients diagnosed with cerebral palsy, these results may help identify possible inpatient fallers on hospital admission.

[PMID: 27633845](#)

**17. J Clin Pediatr Dent. 2016;40(5):375-87. doi: 10.17796/1053-4628-40.5.375.**

Oral Health Quality of Life in Children with Cerebral Palsy: Parental Perceptions.

El Ashiry EA, Alaki SM, Nouri SM.

**OBJECTIVE:** To assess the parents' perception of the oral health-related quality of life (OHRQOL) in children with Cerebral Palsy (CP) and compare it with normally developing children. **STUDY DESIGN:** 63 children with CP were recruited from 8 disability centers, and 99 healthy controls were recruited from 5 elementary schools. The ages of the children in both groups were from 6-12 years. The Franciscan Hospital for Children Oral Health-Related Quality of Life (FHC-OHRQOL) was used to measure the OHRQOL and an oral examination was conducted in the schools/centers of the children to assess the teeth, gingival health, and oral hygiene. **RESULTS:** The FHC-OHRQOL showed a significant difference in 3 out of 4 sections indicating lower OHRQOL in the CP group. The examination showed no significant difference in the dental and gingival health and in the level of oral hygiene. **CONCLUSION:** The OHRQOL of children with CP is significantly lower than that of normally developing children although the oral health status of children with CP is not significantly different from that of normally developing children.

[PMID: 27617378](#)

**18. Iran J Pediatr. 2016 May 10;26(3):e5303. doi: 10.5812/ijp.5303. eCollection 2016.**

The Comparison of Participation in School-Aged Cerebral Palsy Children and Normal Peers: A Preliminary Study.

Hassani Mehraban A, Hasani M, Amini M.

**BACKGROUND:** Participation in daily activities during childhood is an important aspect for health and social development. **OBJECTIVES:** This study was designed to investigate the participation of children with cerebral palsy aged 8 to 14 years, and their normal peers. **PATIENTS AND METHODS:** In this cross-sectional study, 30 children with cerebral palsy, and 30 normal children were selected via the non-probability convenience sampling. Their participation was evaluated with children's assessment of participation and enjoyment (CAPE) through interviews. **RESULTS:** Significant differences were found between the means of the two groups regarding the diversity, intensity, overall participation ( $P = 0.000$ ) and all types of the activities except the recreational activities. The children with cerebral palsy took part in the skill-based activities and overall activities individually compared to the normal peers. The children with cerebral palsy, in comparison with their normal peers, often performed most of the activities inside the house. The main effect of gender and the interaction between gender and groups were not statistically significant in any of the variables of the CAPE test. **CONCLUSIONS:** Physical disability can influence the children's daily activities and socialization. Understanding the participation of physically disabled children can help health care professionals in designing and introducing appropriate treatment according to their needs.

[PMID: 27617075](#)

**19. Nurs Child Young People. 2016 Sep 12;28(7):19. doi: 10.7748/ncyp.28.7.19.s20.**

Improving transition for young people with cerebral palsy.

[No authors listed]

Background Transitioning from child to adult healthcare services can be difficult and distressing for families. The co-ordination and communication between services needs to be improved.

[PMID: 27615583](#)

**20. Nurs Child Young People. 2016 Sep 12;28(7):19. doi: 10.7748/ncyp.28.7.19.s21.**

Co-ordinated and individualised transition planning for young people with complex needs.

[No authors listed]

Effective transition services can help young people with long-term conditions, such as cerebral palsy, and learning disabilities to learn to practise self-care and develop healthy behaviours. But transition is complicated if multiple specialist services are required.

[PMID: 27615582](#)

## Prevention and Cure

**21. J Perinatol. 2016 Sep 15. doi: 10.1038/jp.2016.154. [Epub ahead of print]**

Neurodevelopmental outcomes in postnatal growth-restricted preterm infants with postnatal head-sparing.

Meyers JM, Bann CM, Stoll BJ, D'Angio CT, Bell EF, Duncan AF, Guillet R.

**OBJECTIVE:** To compare neurodevelopmental outcomes in postnatal growth-restricted infants born <29 weeks with and without postnatal head-sparing (PHS). **STUDY DESIGN:** We analyzed developmental outcomes at 2 years of age among postnatally growth-restricted infants with and without head-sparing. The primary outcome was Bayley III cognitive composite score; secondary outcomes included Bayley III motor composite score, moderate/severe cerebral palsy, gross motor functional classification scale level  $\geq 2$ , and presence or absence of neurodevelopmental impairment (NDI). **RESULTS:** Of 1098 infants evaluated at 18 to 22 months, 658 were postnatally growth restricted, of whom 301 had head-sparing. In the multivariate model including independent risk factors for poor growth and poor developmental outcome, infants with head-sparing had higher adjusted motor composite scores (mean difference 4.65,  $P < 0.01$ ), but no differences in other neurodevelopmental outcomes. **CONCLUSION:** PHS is associated with improved neurodevelopmental outcome in extremely preterm infants, specifically Bayley III motor scores, but whether beneficial effects of PHS persist later in life is unknown. *Journal of Perinatology* advance online publication, 15 September 2016; doi:10.1038/jp.2016.154.

[PMID: 27629374](#)

**22. J Physiother. 2016 Aug 5. pii: S1836-9553(16)30038-8. doi: 10.1016/j.jphys.2016.07.002. [Epub ahead of print]**

Motor trajectories from birth to 5 years of children born at less than 30 weeks' gestation: early predictors and functional implications. Protocol for a prospective cohort study.

Spittle AJ, McGinley JL, Thompson D, Clark R, FitzGerald TL, Mentiplay BF, Lee KJ, Olsen JE, Burnett A, Treyvaud K, Josev E, Alexander B, Kelly CE, Doyle LW, Anderson PJ, Cheong JL.

**INTRODUCTION:** Motor impairments are one of the most frequently reported adverse neurodevelopmental consequences in children born < 30 weeks' gestation. Up to 15% of children born at < 30 weeks have cerebral palsy and an additional 50% have mild to severe motor impairment at school age. The first 5 years of life are critical for the development of fundamental motor skills. These skills form the basis for more complex skills that are required to competently and confidently participate in schooling, sporting and recreational activities. In children born at < 30 weeks' gestation, the trajectory of motor development from birth to 5 years is not fully understood. The neural alterations that underpin motor impairments in these children are also unclear. It is essential to determine if early clinical evaluations and neuroimaging biomarkers can predict later motor impairment and associated functional problems at 5 years of age. This will help to identify children who will benefit the most from early intervention and improve functional outcomes at school age. **RESEARCH AIMS:** The primary aim of this study is to compare the prevalence of motor impairment from birth to 5 years of age between children born at < 30 weeks and term-born controls, and to determine whether persistent abnormal motor assessments in the newborn period in those born at < 30 weeks predict abnormal motor functioning at 5 years of age. Secondary aims for children born at < 30 weeks and term-born children are: 1) to determine whether novel early magnetic resonance imaging-based structural or functional biomarkers that can predict motor impairments at 5 years are detectable in the neonatal period; 2) to investigate the association between motor impairments and concurrent deficits in body structure and function at 5 years of age; and 3) to explore how motor impairments at 5 years (including abnormalities of gait, postural control and strength) are associated with concurrent functional outcomes, including physical activity, cognitive ability, learning ability, and behavioural and emotional problems. **DESIGN:** Prospective longitudinal cohort study. **PARTICIPANTS AND SETTING:** 150 preterm children (born at < 30 weeks' gestation) and 151 term-born children (born at > 36 completed weeks' gestation and weighing > 2499g) admitted to the Royal Women's Hospital, Melbourne, were recruited at birth and will be invited to participate in a 5-year follow-up study. **PROCEDURE:** This study will examine previously collected data (from birth to 2 years) that comprise detailed motor assessments, and structural and functional brain MRI images. At 5 years, preterm and term, children will be examined using comprehensive motor assessments, including: the Movement Assessment Battery for Children (2nd edition) and measures of gait function through spatiotemporal (assessed with the GAITRite® Walkway) and dynamic postural control (assessed with Microsoft Kinect) variables; and hand grip strength (assessed with a dynamometer); and measures of physical activity (assessed using accelerometry), cognitive development (assessed with Wechsler Preschool and Primary Scale of Intelligence), and emotional and behavioural status (assessed with the Strengths and Difficulties Questionnaire and the Developmental and Wellbeing Assessment). At the 5-year assessment, parents/caregivers will be asked to complete questionnaires on demographics, physical activity, activities of daily living, behaviour, additional therapy (eg, physiotherapy and occupational therapy), and motor function (assessed with Pediatric Evaluation of Disability Inventory, Pediatric Quality of Life Questionnaire, the Little Developmental Co-ordination Questionnaire and an activity diary). **ANALYSIS:** For the primary aim, the prevalence of motor impairment from birth to 5 years will be compared between children born at < 30 weeks and at term, using the proportion of children classified as abnormal at each of the time points (term age, 1, 2 and 5 years). Persistent motor impairments during the neonatal period will be assessed as a predictor of severity of motor impairment at 5 years of age in children born < 30 weeks using linear regression. Models will be fitted using generalised estimating equations to allow for the clustering of multiple births. Analysis will be repeated with adjustment for predictors of motor outcome, including additional therapy, sex, brain injury and chronic lung disease. **DISCUSSION/SIGNIFICANCE:** Understanding the developmental precursors of motor impairment in children born before 30 weeks is essential for limiting disruption to skill development, and potential secondary impacts on physical activity, participation, academic achievement, self-esteem and associated outcomes (such as obesity, poor physical fitness and social isolation). An improved understanding of motor skill development will enable targeting of interventions and streamlining of services to children at highest risk of motor impairments.

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