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Interventions and Management

1. Conf Proc IEEE Eng Med Biol Soc. 2014 Aug;2014:3069-72. doi: 10.1109/EMBC.2014.6944271.

A modular low-clearance wrist orthosis for improving wrist motion in children with Cerebral Palsy.

Holley D, Johnson M, Harris G, Beardsley S.

Children with Cerebral Palsy (CP) often exhibit impairments in the coordination of the grip and lift phases of arm movements that directly impact their ability to perform activities of daily living (ADLs). The application of assistive robotic therapy to children with spastic hemiplegic CP has shown that augmented movement training can lead to improved functional outcomes and improved arm kinematics. Assistive robotic therapy of the wrist has been shown to help improve motor skills in stroke patients, but the devices employed are often large and obtrusive, focusing on a repeated motion rather than a task-based itinerary. Here, we propose a lightweight low clearance wrist orthosis for use in children with Cerebral Palsy that actuates pronation/supination and flexion/extension of the wrist.

[PMID: 25570639](#) [PubMed - in process]

2. Conf Proc IEEE Eng Med Biol Soc. 2014 Aug;2014:2330-3. doi: 10.1109/EMBC.2014.6944087.

Upper limb functional assessment of children with cerebral palsy using a sorting box.

Quijano-Gonzalez Y, Melendez-Calderon A, Burdet E, Chong-Quero JE, Villanueva-Ayala D, Perez-Moreno JC.

We investigated the use of a sorting box to obtain a quantitative assessment of upper limb motor function in children with cerebral palsy. In our study, children with and without cerebral palsy placed and removed geometrical objects of a sorting-box while their wrist position was monitored by a camera-based, motion-tracking system. We analyzed three different smoothness metrics (logarithmic dimensionless jerk, spectral arc-length and number of peaks) together with time to task completion. Our results suggest that smoothness metrics are an effective tool to distinguish between impaired and non-impaired subjects, as well as to quantify differences between the affected and less-affected sides in children with hemiparetic cerebral palsy.

[PMID: 25570455](#) [PubMed - in process]

3. Conf Proc IEEE Eng Med Biol Soc. 2014 Aug;2014:2525-8. doi: 10.1109/EMBC.2014.6944136.**Evaluation of upper extremity movement characteristics during standardized pediatric functional assessment with a Kinect®-based markerless motion analysis system.**

Rammer JR, Krzak JJ, Riedel SA, Harris GF.

A recently developed and evaluated upper extremity (UE) markerless motion analysis system based on the Microsoft® Kinect® has potential for improving functional assessment of patients with hemiplegic cerebral palsy. 12 typically-developing adolescents ages 12-17 were evaluated using both the Kinect-based system and the Shriners Hospitals for Children Upper Extremity Evaluation (SHUEE), a validated measure of UE motion. The study established population means of UE kinematic parameters for each activity. Statistical correlation analysis was used to identify key kinematic metrics used to develop automatic scoring algorithms. The Kinect motion analysis platform is technically sound and can be applied to standardized task-based UE evaluation while providing enhanced sensitivity in clinical analysis and automation through scoring algorithms.

[PMID: 25570504](#) [PubMed - in process]

4. J Neurosci. 2015 Jan 7;35(1):84-95. doi: 10.1523/JNEUROSCI.1737-14.2015.**Temporal plasticity involved in recovery from manual dexterity deficit after motor cortex lesion in macaque monkeys.**

Murata Y1, Higo N2, Hayashi T3, Nishimura Y4, Sugiyama Y5, Oishi T6, Tsukada H7, Isa T8, Onoe H9.

The question of how intensive motor training restores motor function after brain damage or stroke remains unresolved. Here we show that the ipsilesional ventral premotor cortex (PMv) and perilesional primary motor cortex (M1) of rhesus macaque monkeys are involved in the recovery of manual dexterity after a lesion of M1. A focal lesion of the hand digit area in M1 was made by means of ibotenic acid injection. This lesion initially caused flaccid paralysis in the contralateral hand but was followed by functional recovery of hand movements, including precision grip, during the course of daily postlesion motor training. Brain imaging of regional cerebral blood flow by means of H₂ (15)O-positron emission tomography revealed enhanced activity of the PMv during the early postrecovery period and increased functional connectivity within M1 during the late postrecovery period. The causal role of these areas in motor recovery was confirmed by means of pharmacological inactivation by muscimol during the different recovery periods. These findings indicate that, in both the remaining primary motor and premotor cortical areas, time-dependent plastic changes in neural activity and connectivity are involved in functional recovery from the motor deficit caused by the M1 lesion. Therefore, it is likely that the PMv, an area distant from the core of the lesion, plays an important role during the early postrecovery period, whereas the perilesional M1 contributes to functional recovery especially during the late postrecovery period.

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[PMID: 25568105](#) [PubMed - in process]

5. Ann Rehabil Med. 2014 Dec;38(6):784-90. doi: 10.5535/arm.2014.38.6.784. Epub 2014 Dec 24.**Age specificity in general and rehabilitation medical services in children with cerebral palsy.**

Kim DA1, Hong HS2, Lee HY2, Lee HS1, Kang MS1.

OBJECTIVE: To review the medical utilization in children with cerebral palsy according to age and discern particularities. **METHODS:** From January 2007 to December 2007, 10,659 children and adolescents between 1 and 18 years of age who had filed national insurance claims for a diagnosis of cerebral palsy were selected. Age was chosen as an independent variable, and the population was categorized into specific age groups to verify any differences in medical service utilization. Admission duration to rehabilitation, number of visits to rehabilitation outpatient clinics, numbers of admission dates and outpatient clinic visits for general medical services, number of rehabilitation utilizations, and type of rehabilitations treatment were selected as dependent variables. One-way ANOVA was used for statistical evaluation, and analysis was done with SAS software. **RESULTS:** In general

medical use, adolescences diagnosed with cerebral palsy had the highest mean admission duration ($p < 0.001$). The mean visit day to outpatient clinics for general medical services was highest for infants ($p < 0.001$). In rehabilitation treatment, infants diagnosed with cerebral palsy had the highest mean admission duration ($p < 0.001$). The mean visit day to outpatient clinics for rehabilitation treatment was highest for infants ($p < 0.001$). **CONCLUSION:** Significant differences in use of general and rehabilitation medical services among pediatric age groups with cerebral palsy were evident. This implies that particular attention is necessary when setting up a national medical care policy for patient with cerebral palsy.

[PMID: 25566477](#) [PubMed] Free full text

6. Dev Med Child Neurol. 2015 Jan 2. doi: 10.1111/dmcn.12667. [Epub ahead of print]

Motor endplate-targeted botulinum toxin injections of the gracilis muscle in children with cerebral palsy.

Van Campenhout A1, Bar-On L, Desloovere K, Huenaearts C, Molenaers G.

AIM: Intramuscular botulinum toxin-A (BoNT-A) injections reduce spasticity by blocking neurotransmission at the motor endplate (MEP). The goal of this study was to assess the reduction in spasticity achieved by injecting BoNT-A at different sites of the gracilis muscle. **METHOD:** Thirty-four gracilis muscles, in 27 children (10 females and 17 males, mean age of 8.6y [SD 2.5y]) with spastic cerebral palsy (unilateral and bilateral, Gross Motor Function Classification System [GMFCS] levels I-IV), were randomly assigned to one of two groups. In one group BoNT-A was injected proximally (at a site 25% of the distance from the pubic tubercle and the medial epicondyle) and in the other it was injected at the MEP zones (half of the dose was administered at 30% of this distance and half at 60%). Spasticity was assessed before and after BoNT-A injection using simultaneous measurements of surface electromyography (sEMG) and angular velocity during passive muscle stretch applied at different velocities. The primary outcome measure included the velocity-dependent change in average root mean square electromyography (RMS-EMG). Secondary outcome was assessed with the Modified Ashworth Scale (MAS) and Modified Tardieu Scale (MTS). **RESULTS:** Spasticity decreased more in MEP-targeted muscles than in proximally injected muscles, as demonstrated by a larger reduction in average RMS-EMG values ($p = 0.04$), though this difference was not found with the MAS or MTS. **INTERPRETATION:** The results suggest that BoNT-A injection of the gracilis at sites with a high concentration of MEPS is effective at reducing spasticity. These preliminary findings should be confirmed by larger studies. In the case of long muscles, such as the gracilis, the injection site is important.

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7. Conf Proc IEEE Eng Med Biol Soc. 2014 Aug;2014:5288-91. doi: 10.1109/EMBC.2014.6944819.

Home-based tele-assisted robotic rehabilitation of joint impairments in children with cerebral palsy.

Kai Chen, Yupeng Ren, Gaebler-Spira D, Li-Qun Zhang.

A portable rehabilitation robot incorporating intelligent stretching, robot-guided voluntary movement training with motivating games and tele-rehabilitation was developed to provide convenient and cost-effective rehabilitation to children with cerebral palsy (CP) and extend rehabilitation care beyond hospital. Clinicians interact with the patients remotely for periodic evaluations and updated guidance. The tele-assisted stretching and active movement training was done over 6-week 18 sessions on the impaired ankle of 23 children with CP in their home setting. Treatment effectiveness was evaluated using biomechanical measures and clinical outcome measures. After the tele-assisted home robotic rehabilitation intervention, there were significant increases in the ankle passive and active range of motion, muscle strength, a decrease in spasticity, and increases in balance and selective control assessment of lower-extremity.

[PMID: 25571187](#) [PubMed - in process]

8. Conf Proc IEEE Eng Med Biol Soc. 2014 Aug;2014:3529-32. doi: 10.1109/EMBC.2014.6944384.**Locomotor training through a 3D cable-driven robotic system for walking function in children with cerebral palsy: A pilot study.**

Ming Wu, Kim J, Arora P, Gaebler-Spira DJ, Yunhui Zhang.

Locomotor training using treadmill has been shown to elicit significant improvements in locomotor ability for some children with cerebral palsy (CP), the functional gains are relatively small and it requires greater involvement from a physical therapist. Current robotic gait training systems are effective in reducing the strenuous work of a physical therapist during locomotor training, but are less effective in improving locomotor function in some children with CP due to the limitations of the systems. Thus, a 3D cable-driven robotic gait training system was developed and tested in five children with CP through a 6 week of long-term gait training. Results indicated that both overground walking speed and 6 minute walking distance improved after robot assisted treadmill training through the cable-driven robotic system, and partially retained at 8 weeks after the end of training. Results from this pilot study indicated that it seems feasible to conduct locomotor training in children with CP through the 3D cable-driven robotic system.

[PMID: 25570752](#) [PubMed - in process]

9. Conf Proc IEEE Eng Med Biol Soc. 2014 Aug;2014:1186-9. doi: 10.1109/EMBC.2014.6943808.**Position versus force control: Using the 2-DOF robotic ankle trainer to assess ankle's motor control.**

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

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

[PMID: 25570176](#) [PubMed - in process]

10. Muscle Nerve. 2014 Dec 30. doi: 10.1002/mus.24549. [Epub ahead of print]**Ultrasound characterization of medial gastrocnemius tissue composition in children with spastic cerebral palsy.**

Pitcher CA1, Elliott CM, Panizzolo FA, Valentine JP, Stannage K, Reid SL.

Introduction: This study aimed to characterize muscle composition of the medial gastrocnemius in children with spastic cerebral palsy (SCP) using quantitative ultrasound. **Methods:** Forty children with SCP aged 4-14 years participated. Children were grouped according to the gross motor function classification system (GMFCS I-V) and compared to a cohort of age- and gender-matched typically developing children (TD; n=12). Ultrasound scans were taken of the medial gastrocnemius. Images were then characterized using grayscale statistics to determine mean echo intensity (EI) and number of spatially-connected homogenous regions (i.e. blobs). **Results:** Significant differences in skeletal muscle composition were found between children with SCP and their TD peers. Children classified as GMFCS III consistently exhibited highest EI and blob area. **Discussion:** This study demonstrates altered tissue composition in children with SCP visualized using ultrasound. Further work is required to determine the pathophysiology contributing to these alterations in SCP. This article is protected by copyright. All rights reserved.

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[PMID: 25556656](#) [PubMed - as supplied by publisher]

11. Conf Proc IEEE Eng Med Biol Soc. 2014 Aug;2014:4403-6. doi: 10.1109/EMBC.2014.6944600.**Estimation of intrinsic joint impedance using quasi-static passive and dynamic methods in individuals with and without Cerebral Palsy.**

Androwis GJ, Michael PA, Strongwater A, Foulds RA.

Modeling the passive behavior of the knee in subjects with spasticity involves the applied external torques (e.g. gravitational torque), the intrinsic moments due to tissue properties, as well as active, neurally defined moments resulting from the hypersensitivity of reflexes introduced by disability. In order to provide estimates of the necessary intrinsic terms in the equation of motion, the push-pull and Wartenberg Pendulum Knee Drop (PKD) tests were administered. Four subjects without disability and two subjects with Cerebral Palsy (CP) were evaluated for their active and intrinsic knee stiffness parameters. Separation of these two terms requires an additional stiffness term be added to the traditional equation of motion. This holds true for subjects with and without neurological disability. Very interestingly, the optimized non-disabled PKD produced lumped stiffness (K) that is similar to the push-pull passive stiffness (KI) for both populations. On the other hand the optimized K value in the PKD test for subjects with disability was approximately 19 times larger than the KI value found graphically from the push-pull test. This leads us to the conclusion that we can partition our lumped K as the sum of a neurally generated stiffness (Ka) and KI to complete the trajectory model. Therefore, this study shows that spasticity is a velocity dependent, that would not appear in disabled individuals unless the examined limb has a non-zero velocity.

[PMID: 25570968](#) [PubMed - in process]

12. Med Arch. 2014 Jun;68(3):182-3. doi: 10.5455/medarh.2014.68.182-183. Epub 2014 May 31.**Operative treatment of the knee contractures in cerebral palsy patients.**

Bozinovski Z1, Popovski N1.

INTRODUCTION: Knee flexion is one of the main problems of the lower extremities in cerebral palsy patients. Many operative procedures are recommended for contractures of the knee in cerebral palsy patients. We performed simple operation and analyzed the results after operative treatment with nine years follow up. **METHOD:** 85 patients with spastic cerebral palsy were treated in period 2001 - 2010. 40 were ambulatory and 45 non ambulatory with ability to stand with support. All of them underwent same surgical procedure with distal hamstrings lengthening. Tenotomies were performed on m. semitendinosus, m. semimembranosus, m. gracillis and biceps femoris. Only m. semitendinosus was tenotomized completely, other muscles were tenotomized only on tendinous part. The patients had a plaster immobilization for five days after the surgery with the knee extended. **RESULTS:** All 85 patients had improvement of the popliteal angle pre and post operative respectively. Improvement in the crouch gait was noticed in the period of rehabilitation. We had no complication with the wound. Three of the patients had overcorrection and achieved recurvatum of the knees. **CONCLUSION:** We consider this procedure very simple with satisfying improvement of standing, walking and sitting abilities in children with spastic cerebral palsy.

[PMID: 25568529](#) [PubMed - in process]

13. Conf Proc IEEE Eng Med Biol Soc. 2014 Aug;2014:4091-4. doi: 10.1109/EMBC.2014.6944523.**Development of a clinician worn device for the evaluation of abnormal muscle tone.**

Brokaw EB, Heldman DA, Plott RJ, Rapp EJ, Montgomery EB, Giuffrida JP.

Neurological disorders such as cerebral palsy commonly result in abnormal muscle hyperactivity that negatively effects functional use of the affected limbs. Individuals with cerebral palsy often present with a mix of spasticity and dystonia, and it can be difficult to distinguish between the effects of these types of abnormal tone. Different types of abnormal tone respond differently to treatments such as deep brain stimulation and baclofen. Conventional clinical evaluation techniques provide minimal information for distinguishing abnormal tone characteristics and changes from treatment. Devices that quantify abnormal tone characteristics can help distinguish between the effects of different types of abnormal muscle tone, and help to quantify treatment effects. This paper discusses the development and initial evaluation of MyoSense(TM), a clinician worn device for the quantification and

differentiation of abnormal muscle tone. MyoSense evaluates the orientation, speed, and force during clinician manipulation of the affected limbs with a protocol that is similar to conventional practice for evaluating abnormal tone. Evaluation of the MyoSense device, using a mechanical apparatus to simulate abnormal muscle tone, showed good resolution of abnormal tone characteristics. Using a procedure directly modeled after conventional clinical evaluation of abnormal tone, MyoSense data showed good correlation with simulated profiles, 0.8 for spasticity and 0.93 for hypertonia. Evaluation of average change across different limb manipulation speeds, to mitigate acceleration and mechanical effects, resulted in MyoSense data correlations to simulated profiles of 0.99 for spasticity, spasticity with a catch, and dystonia. Overall these results show promise for future clinical evaluation of the MyoSense device.

[PMID: 25570891](#) [PubMed - in process]

14. Dan Med J. 2015 Jan;62(1):A4999.

Positive experience with intrathecal baclofen treatment in children with severe cerebral palsy.

Overgård TM1, Kjærsgaard-Hansen L, Søre M, Illum NO.

INTRODUCTION: Treatment of severe spasticity and dystonia with intrathecal baclofen (ITB) in children has been shown to be effective and has therefore been employed in the Region of Southern Denmark. The aim of this retrospective study was to analyse the efficacy and adverse events since ITB was introduced in 2003. **METHODS:** A total of 46 children who had a baclofen pump from April 2003 to January 2013 were included. The children's medical records were reviewed and clinical characteristics, efficacy and adverse events were registered. The efficacy of treatment experienced by parents was ascertained by telephone interviews, and data were rated on a Likert scale ranging from one to five, where one was no effect and five was marked improvement. **RESULTS:** After ITB, spasticity was reduced from a median of four to two in the upper extremities and from a median of four to one in the lower extremities. Baclofen infusion was 105.1-2,000 micrograms/day (mean 494.9 micrograms/day). Oral baclofen was reduced from 27.3 to 17.7 mg/day after ITB ($p < 0.01$). The parents' assessment of improvement in well-being, function and ease of care of their child had a mean score of 3.7, 2.2 and 3.4, respectively. 87.1% of parents stated that ITB had been worthwhile, and 90.3% would recommend it to other parents. Most infectious and mechanical adverse events were experienced during the first 200 days after pump implantation. The total complication rate was 0.40 per pump year. **CONCLUSION:** ITB resulted in reduced spasticity in children with severe spasticity and dystonia, and ITB could be considered safe. Parents' satisfaction with ITB was rated as good and most parents would recommend ITB to others. **FUNDING:** not relevant. **TRIAL REGISTRATION:** not relevant.

[PMID: 25557334](#) [PubMed - in process]

15. Conf Proc IEEE Eng Med Biol Soc. 2014 Aug;2014:3602-5. doi: 10.1109/EMBC.2014.6944402.

Usability testing of gaming and social media applications for stroke and cerebral palsy upper limb rehabilitation.

Valdes BA, Hilderman CG, Chai-Ting Hung, Shirzad N, Van der Loos HF.

As part of the FEATHERS (Functional Engagement in Assisted Therapy Through Exercise Robotics) project, two motion tracking and one social networking applications were developed for upper limb rehabilitation of stroke survivors and teenagers with cerebral palsy. The project aims to improve the engagement of clients during therapy by using video games and a social media platform. The applications allow users to control a cursor on a personal computer through bimanual motions, and to interact with their peers and therapists through the social media. The tracking applications use either a Microsoft Kinect or a PlayStation Eye camera, and the social media application was developed on Facebook. This paper presents a usability testing of these applications that was conducted with therapists from two rehabilitation clinics. The "Cognitive Walkthrough" and "Think Aloud" methods were used. The objectives of the study were to investigate the ease of use and potential issues or improvements of the applications, as well as the factors that facilitate and impede the adoption of technology in current rehabilitation programs.

[PMID: 25570770](#) [PubMed - in process]

16. Curr Opin Pediatr. 2015 Feb;27(1):75-81. doi: 10.1097/MOP.000000000000175.

Considerations and intervention in congenital muscular torticollis.

Suhr MC1, Oledzka M.

PURPOSE OF REVIEW: To present the current literature regarding congenital muscular torticollis (CMT) to promote the most effective and evidence-based intervention. CMT is a musculoskeletal deformity observed at birth or in infancy, characterized by persistent head tilt toward the ipsilateral side with the chin rotated toward the contralateral side. The incidence of torticollis is on the rise and as a result there has been a surge in the literature on the topic, however, until recently, there was little consensus on the treatment approach. **RECENT FINDINGS:** Research on CMT has gone in several directions. One branch is looking at diagnostics, imaging, and attempting to understand the underlying disease behind torticollis, down to the cellular level. This information may be helpful in the other, more clinical research vein to determine prognosis, establish plan of care, and create guidelines for the treatment of infants with torticollis. **SUMMARY:** CMT presents as a muscular imbalance. We know from the pediatric and adult literature, whether it is about cerebral palsy or anterior cruciate ligament reconstruction, that muscle imbalances can lead to skeletal changes, postural dysfunction, and impaired movement patterns. These can lead to functional limitations and limitations in participation. CMT, therefore, needs to be addressed. Although this article presents the current evidence and guidelines for treatment, there is still much to be learned regarding disease, optimal intervention, duration of treatment, and timing of follow-up.

VIDEO : <http://links.lww.com/MOP/A24>.

[PMID: 25565573](#) [PubMed - in process]

17. Res Dev Disabil. 2015 Jan 3;38C:192-201. doi: 10.1016/j.ridd.2014.12.021. [Epub ahead of print]

Clinical signs suggestive of pharyngeal dysphagia in preschool children with cerebral palsy.

Benfer KA1, Weir KA2, Bell KL3, Ware RS4, Davies PS5, Boyd RN6.

This study aimed to determine the discriminative validity, reproducibility, and prevalence of clinical signs suggestive of pharyngeal dysphagia according to gross motor function in children with cerebral palsy (CP). It was a cross-sectional population-based study of 130 children diagnosed with CP at 18-36 months (mean=27.4, 81 males) and 40 children with typical development (TD, mean=26.2, 18 males). Sixteen signs suggestive of pharyngeal phase impairment were directly observed in a videoed mealtime by a speech pathologist, and reported by parents on a questionnaire. Gross motor function was classified using the Gross Motor Function Classification System. The study found that 67.7% of children had clinical signs, and this increased with poorer gross motor function (OR=1.7, $p<0.01$). Parents reported clinical signs in 46.2% of children, with 60% agreement with direct clinical mealtime assessment ($\kappa=0.2$, $p<0.01$). The most common signs on direct assessment were coughing (44.7%), multiple swallows (25.2%), gurgly voice (20.3%), wet breathing (18.7%) and gagging (11.4%). 37.5% of children with TD had clinical signs, mostly observed on fluids. Dysphagia cut-points were modified to exclude a single cough on fluids, with a modified prevalence estimate proposed as 50.8%. Clinical signs suggestive of pharyngeal dysphagia are common in children with CP, even those with ambulatory CP. Parent-report on 16 specific signs remains a feasible screening method. While coughing was consistently identified by clinicians, it may not reflect children's regular performance, and was not sufficiently discriminative in children aged 18-36 months.

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18. Pediatr Neurol. 2014 Oct 31. pii: S0887-8994(14)00657-2. doi: 10.1016/j.pediatrneurol.2014.10.026. [Epub ahead of print]

The Communication Function Classification System: Cultural Adaptation, Validity, and Reliability of the Farsi Version for Patients With Cerebral Palsy.

Soleymani Z1, Joveini G2, Baghestani AR3.

BACKGROUND: This study developed a Farsi language Communication Function Classification System and then tested its reliability and validity. **METHODS:** Communication Function Classification System is designed to classify the communication functions of individuals with cerebral palsy. Up until now, there has been no instrument for assessment of this communication function in Iran. The English Communication Function Classification System was translated into Farsi and cross-culturally modified by a panel of experts. Professionals and parents then assessed the content validity of the modified version. A backtranslation of the Farsi version was confirmed by the developer of the English Communication Function Classification System. Face validity was assessed by therapists and parents of 10 patients. The Farsi Communication Function Classification System was administered to 152 individuals with cerebral palsy (age, 2 to 18 years; median age, 10 years; mean age, 9.9 years; standard deviation, 4.3 years). Inter-rater reliability was analyzed between parents, occupational therapists, and speech and language pathologists. The test-retest reliability was assessed for 75 patients with a 14 day interval between tests. **RESULTS:** The inter-rater reliability of the Communication Function Classification System was 0.81 between speech and language pathologists and occupational therapists, 0.74 between parents and occupational therapists, and 0.88 between parents and speech and language pathologists. The test-retest reliability was 0.96 for occupational therapists, 0.98 for speech and language pathologists, and 0.94 for parents. **CONCLUSIONS:** The findings suggest that the Farsi version of Communication Function Classification System is a reliable and valid measure that can be used in clinical settings to assess communication function in patients with cerebral palsy.

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19. Dev Med Child Neurol. 2014 Dec;56(12):1132-3. doi: 10.1111/dmcn.12625.

Translating evidence into practice.

Green D1.

Comment on: Meaningfulness of mean group results for determining the optimal motor rehabilitation program for an individual child with cerebral palsy. [Dev Med Child Neurol. 2014]

[PMID: 25387449](#) [PubMed - indexed for MEDLINE]

20. Pediatr Neurol. 2014 Dec 3. pii: S0887-8994(14)00711-5. doi: 10.1016/j.pediatrneurol.2014.11.016. [Epub ahead of print]

Hemiparesis and Epilepsy Are Associated With Worse Reported Health Status Following Unilateral Stroke in Children.

Smith SE1, Vargas G2, Cucchiara AJ3, Zelonis SJ4, Beslow LA5.

BACKGROUND: Perinatal and childhood stroke result in neurological impairment in the majority of survivors, but less is known about patient and parent perception of function following stroke in children. Our aim was to characterize parent-proxy and child-reported health status in children following unilateral arterial ischemic stroke or intraparenchymal hemorrhage. **METHODS:** Fifty-nine children 2-18 years (30 girls, 29 boys) with unilateral arterial ischemic stroke or spontaneous intraparenchymal hemorrhage at least 6 months before evaluation were enrolled from a single center. The PedsQL version 4.0 Generic Short Form and PedsQL version 3.0 Cerebral Palsy Module were administered to childhood stroke subjects and parents. Generic PedsQL Inventory scores were compared between children with stroke and published data from healthy children. Reported health status scores for children with varying degrees of hemiparesis were compared. **RESULTS:** Children with stroke had lower reported health status scores on the Generic PedsQL Inventory than healthy children. Children with moderate-severe hemiparesis had worse scores than children without hemiparesis on several measures of the Cerebral Palsy Module as reported by both parents and children. The parents of children with epilepsy reported worse scores on several measures compared with children without epilepsy, and the parent scores were lower on several measures for children with lower intelligence quotients. Agreement between parent and child scores was better on the Cerebral Palsy Module than on the Generic Inventory. **CONCLUSIONS:** Children with stroke have worse reported health status than healthy controls. Degree of hemiparesis, epilepsy, and lower intelligence quotient affect reported health status on some measures. Agreement between parent-proxy and child scores ranges from slight to good which suggests that

both provide useful information.

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[PMID: 25559938](#) [PubMed - as supplied by publisher]

21. Dev Med Child Neurol. 2014 Dec;56(12):1138-9. doi: 10.1111/dmcn.12533. Epub 2014 Jul 15.

Rethinking computer design from a disabilities rights standpoint.

Lobo MA1.

Comment on: A cross-sectional study examining computer task completion by adolescents with cerebral palsy across the Manual Ability Classification System levels. [Dev Med Child Neurol. 2014]

[PMID: 25039235](#) [PubMed - indexed for MEDLINE]

22. Vestn Ross Akad Med Nauk. 2014;(5-6):98-101.

Psychological features of mothers bringing up disabled children [Article in Russian]

[No authors listed]

BACKGROUND: Research objective was to define psychological makers of mothers bringing up disabled children for scientific justification of the family psychotherapy branches. **PATIENTS AND METHODS:** 60 mothers bringing up children of early age with infantile cerebral palsy and 50 mothers of children with compensation of perinatal affections of the central nervous system by the 1 life year are surveyed. Personal characteristics, family orientations of mothers, child and mother relations, awareness of mothers on the children health state and the attitude to their rehabilitation were studied by means of psychological techniques. **RESULTS:** It is found out that the mothers bringing up disabled children more often have emotional disorders, negative attitude to divorce and give the leading role in a family to the husband less often they show hypoguardianship of the child than the mothers of children with compensation of perinatal affections of the central nervous system. Mothers are less satisfied with the child development, they are more often worried about disorders of development of movements, speech and mental development delay, small appetite of the child, they feel helplessness in rehabilitation more often, note the ambiguity of its prospects. They understand that their child needs the help of the qualified experts: neurologist, orthopaedist, logopedist, psychologist, but they aren't satisfied with communication with them more often, underestimate own role in rehabilitation. **CONCLUSION:** The revealed characteristics prove the necessity and define the main directions of family psychotherapy--correction of mother's emotional disorders, child and parental relations, increase of medical and psychological competence that allows to increase efficiency of rehabilitation.

[PMID: 25558688](#) [PubMed - in process]

Prevention and Cure

24. Dan Med J. 2015 Jan;62(1):A4990.

Epidemiology of cerebral palsy in Southern Denmark.

Frøslev-Friis C1, Dunkhase-Heinl U, Andersen JD, Stausbøl-Grøn B, Hansen AV, Garne E.

INTRODUCTION: The aim of this study was to describe the prevalence, subtypes, severity and neuroimaging findings of cerebral palsy (CP) in a cohort of children born in Southern Denmark. Risk factors were analysed and aetiology considered. **METHODS:** A population-based cohort study covering 17,580 live births from 2003 to 2008. **RESULTS:** The study included 43 children diagnosed with CP. The overall prevalence of CP was 2.4 per 1,000 live births (95% confidence interval (CI): 1.8-3.2). The gestational age (GA)-specific prevalence ranged from 63.5 per 1,000 live births for GA < 32 weeks to 1.3 for GA ≥ 37 weeks. Almost half of the children were born preterm and 28% were from multiple pregnancies. The prevalence of CP was 1.8 per 1,000 in singletons and 15.4 per 1,000 in multiples. Low GA and birth weight were risk factors for CP, also after stratification for multiple births. Spastic CP was the predominating subtype of CP, and 24 children (56%) were able to walk independently. White-matter lesions were the most common magnetic resonance imaging finding, and the aetiology of CP was known in 37% of cases. **CONCLUSION:** The overall prevalence of CP was slightly higher than that found in other Scandinavian studies due to its higher prevalence in the preterm group. Possible explanations include the high rate of multiple births in the background population. Neuroimaging findings were abnormal in the majority of children with CP, but aetiology could only be established in one third of the children. Primary prevention of CP is possible if the numbers of preterm births and multiple pregnancies can be reduced. **FUNDING:** The Danish Cerebral Palsy Follow-up Programme is supported by the foundation "Ludvig og Sara Elsass Fond".

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25. J Matern Fetal Neonatal Med. 2015 Jan 8:1-7. [Epub ahead of print]

Impact of chorioamnionitis on short- and long-term outcomes in very low birth weight preterm infants: the Neonatal Research Network Japan.

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Objective: To evaluate the short- and long-term outcomes among very low birth weight (VLBW) preterm infants after histologic chorioamnionitis (HCA). **Methods:** We performed a retrospective analysis of 5849 single infants (birth weight <1500 g) born at a gestational age between 22 + 0 and 33 + 6 weeks. Clinical data were obtained from the Neonatal Research Network Japan between 2003 and 2007. Multivariable logistic regression analyses were performed to assess the effect of HCA on short- and long-term outcome. **Results:** According to logistic regression analysis, HCA was associated with lower incidence of respiratory distress syndrome (odds ratio [OR] = 0.54; p < 0.001), increased chronic lung disease (OR = 1.68; p < 0.001) and sepsis (OR = 1.71; p < 0.001) and as a short-term outcomes. There was no significant association with intraventricular hemorrhage (OR = 1.11; p = 0.33), periventricular leukomalacia (OR = 1.07; p = .070) and death before discharge (OR = 0.97; p = 0.084). HCA was associated with increased home oxygen therapy (OR = 3.09; p < 0.001), but not with cerebral palsy (CP; OR = 0.91; p = 0.63), develop quotient < 70 (OR = 1.27; p = 0.17), visual impairment (OR = 1.08; p = 0.77), severe hearing impairment (OR = 1.28; p = 0.62) and death (OR = 0.98; p = 0.91) before three years of age. **Conclusions:** In this retrospective population-based study in Japan, HCA was not a risk factor for death, neurodevelopmental impairment and CP in VLBW three-year-old preterm infants.

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26. JAMA Pediatr. 2015 Jan 5. doi: 10.1001/jamapediatrics.2014.3036. [Epub ahead of print]

Risk for Cerebral Palsy in Infants With Total Serum Bilirubin Levels at or Above the Exchange Transfusion Threshold: A Population-Based Study.

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Importance: Exchange transfusion is recommended for newborns with total serum bilirubin (TSB) levels thought to place them at risk for cerebral palsy (CP). However, the excess risk for CP among these infants is unknown. Objective: To quantify the risks for CP and CP consistent with kernicterus that are associated with high TSB levels based on the 2004 American Academy of Pediatrics exchange transfusion threshold (ETT) guidelines. Design, Setting, and Participants: We enrolled 2 cohorts from a population of 525 409 infants in the Late Impact of Getting Hyperbilirubinemia or Phototherapy (LIGHT) birth cohort. Eligible infants were born at a gestational age of at least 35 weeks at 15 hospitals within the Kaiser Permanente Northern California integrated medical care delivery system from January 1, 1995, through December 31, 2011. Exposures: The exposed cohort included all 1833 infants with at least 1 TSB measurement at or above the ETT based on age at testing, gestational age, and results of direct antiglobulin testing. The unexposed cohort was a 20% random sample of 104 716 infants with TSB levels below the ETT. Main Outcomes and Measures: A pediatric neurologist blinded to the TSB levels reviewed medical records to determine the presence of CP, defined as a nonprogressive congenital motor dysfunction with hypertonia or dyskinesia. Cerebral palsy was judged to be consistent with kernicterus if magnetic resonance imaging of the brain revealed bilateral globus pallidus injury in the setting of dyskinetic CP. Results: We identified CP in 7 of 1833 exposed (0.4%) vs 86 of 104 716 unexposed (0.1%) infants (relative risk, 4.7 [95% CI, 2.2-10.0]). Absolute risk differences were 0.2% (95% CI, 0%-0.5%) for a TSB level 0 to 4.9 mg/dL above the ETT (n = 1705), 0.9% (95% CI, 0.1%-5.3%) for a TSB level 5.0 to 9.9 mg/dL above the ETT (n = 102), and 7.6% (95% CI, 2.1%-24.1%) for a TSB level 10 mg/dL or more above the ETT (n = 26). Cerebral palsy consistent with kernicterus occurred in 3 infants (incidence, 0.57 per 100 000 births); all 3 had TSB levels of more than 5.0 mg/dL above the ETT and at least 2 risk factors for neurotoxicity, such as prematurity, glucose-6-phosphate dehydrogenase deficiency, or hypoxia-ischemia. Conclusions and Relevance: Cerebral palsy consistent with kernicterus occurred only in infants with 2 or more risk factors for neurotoxicity and TSB levels of more than 5 mg/dL above the ETT. Among infants with lower degrees of TSB level elevation, the excess risk for CP is minimal.

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