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Interventions and Management

1. Comparing Unimanual and Bimanual Training in Upper Extremity Function in Children With Unilateral Cerebral Palsy.

Klepper SE, Clayton Krasinski D, Gilb MC, Khalil N.

Pediatr Phys Ther. 2017 Oct;29(4):288-306. doi: 10.1097/PEP.0000000000000438.

PURPOSE: This systematic review compared intensive bimanual therapy (IBT) and modified constraint-induced movement therapy (mCIMT) in upper limb function in children with unilateral cerebral palsy (CP). **METHODS:** Four electronic databases were searched from 2009 through October 2015 for randomized control trials comparing IBT with mCIMT. **RESULTS:** Eight articles met the inclusion criteria; 5 randomized clinical trials with 221 participants with unilateral CP, ages 1.5 to 16 years, who received the intervention in a day camp, clinical, or preschool setting were included. The IBT group performed bimanual motor activities; the mCIMT group performed unilateral motor activities. **CONCLUSION:** There was a strong, nonspecific recommendation for either approach to improve quality of unimanual movement, bimanual capacity, and movement efficiency. There was a weak, specific recommendation for IBT in improving movement quality and a specific but weak recommendation favoring IBT to improve the child's performance on parent-reported outcomes.

[PMID: 28953170](#)

2. Commentary on "Comparing Unimanual and Bimanual Training in Upper Extremity Function in Children With Unilateral Cerebral Palsy".

Harpster K, Miller V.

Pediatr Phys Ther. 2017 Oct;9(4):306. doi: 10.1097/PEP.0000000000000455.

[PMID: 28953171](#)

3. A Novel Mobility Device to Improve Walking for a Child With Cerebral Palsy.

Fergus A.

Pediatr Phys Ther. 2017 Oct;29(4):E1-E7. doi: 10.1097/PEP.0000000000000451.

PURPOSE: To describe the use and outcomes associated with the Upsee in conjunction with Kinesiotape for a child with cerebral palsy. **DESCRIPTIONS:** The Upsee and Kinesiotaping were implemented for 24 weeks with a 31-month-old child

with cerebral palsy, Gross Motor Function Classification System level III. OUTCOMES: She progressed from walking with maximal assistance and extensive gait deviations to walking with supervision with a walker on level surfaces with improved gait. Genu recurvatum, heel strike, scissoring, hip extension, foot placement, step length, and stiff knee in swing improved on the basis of videotaped analyses. The Gross Motor Function Measure-66 improved by 11.4. CONCLUSIONS AND WHAT THIS CASE ADDS: The Upsee is a clinically feasible approach for gait impairments in children through providing increased opportunities for walking while supporting biomechanical alignment. Upsee effectiveness with and without taping is an area for future study.

[PMID: 28953186](#)

4. Creative Dance Practice Improves Postural Control in a Child With Cerebral Palsy.

Stribling K, Christy J.

Pediatr Phys Ther. 2017 Oct;29(4):365-369. doi: 10.1097/PEP.0000000000000450.

PURPOSE: To investigate the effect of creative dance instruction on postural control and balance in an 11-year-old with spastic triplegic cerebral palsy, Gross Motor Function Classification Scale level II. DESCRIPTIONS: We conducted 1-hour dance interventions twice weekly for 8 weeks, with a focus on somatosensory awareness and movement in all planes of motion. Computerized dynamic posturography using the SMART Balance Master/EquiTest (NeuroCom) was used to assess postural control and balance reactions before the first class and following the final class. OUTCOMES: Gains in standing stability, balance recovery, directional control, and endpoint excursion of movement were found. Participation in creative dance lessons appears to improve somatosensory effectiveness and postural control in a child with cerebral palsy. WHAT THIS CASE ADDS: Dance is a fun way to improve balance and coordination. These interventions could be easily implemented into programs for children with cerebral palsy.

[PMID: 28953185](#)

5. Influence of trunk control and lower extremity impairments on gait capacity in children with cerebral palsy.

Balzer J, Marsico P, Mitteregger E, van der Linden ML, Mercer TH, van Hedel HJA.

Disabil Rehabil. 2017 Sep 24:1-7. doi: 10.1080/09638288.2017.1380719. [Epub ahead of print]

PURPOSE: We investigated the combined impact of trunk control and lower extremities impairments on predicting gait capacity in children with cerebral palsy (CP) and evaluated relationships between trunk control and lower extremities impairments. METHODS: Data of 52 children with CP [29 boys, mean age 11 years 9 months (± 4 years 6 months)] were included in this observational study. Gait capacity was measured by the "modified Time Up and Go test". Experienced therapists performed the "Modified Ashworth Scale", "Manual Muscle Test", the "Selective Control Assessment of the Lower Extremity", and the "Trunk Control Measurement Scale". We calculated Spearman correlations coefficients (ρ) and performed regression analyses. RESULTS: Trunk control was the strongest predictor ($\beta = -0.624$, $p < 0.001$) when explaining the variance of gait capacity and remained in the model together with spasticity ($R^2 = 0.67$). Muscle strength and selectivity correlated moderately to strongly with the trunk control and gait capacity ($-0.68 \leq \rho \leq -0.78$), but correlations for the spasticity were low ($\rho < -0.3$). CONCLUSIONS: The interconnection between trunk control, leg muscle strength and selectivity for gait capacity in children with CP was shown. It indicates the significance of these impairments in gait assessment and, potentially, rehabilitation. Implications for Rehabilitation Trunk control was the strongest predictor for gait capacity in a regression model with lower extremity spasticity, muscle strength and selectivity and age as independent variables. Lower extremity muscle strength, selectivity, and trunk control explained a similar amount of gait capacity variance which is higher than that explained by lower extremity spasticity. Lower extremity muscle strength and selectivity correlated strongly with trunk control. Therefore, we cautiously suggest that a combined trunk control and lower extremity training might be promising for improving gait capacity in children with CP (Gross Motor Function Classification System level I-III), which needed to be tested in future intervention-studies.

[PMID: 28944697](#)

6. Yes We Can! A Phenomenological Study of a Sports Camp for Young People With Cerebral Palsy.

Aggerholm K, Moltke Martiny KM.

Adapt Phys Activ Q. 2017 Sep 23:1-20. doi: 10.1123/apaq.2015-0135. [Epub ahead of print]

This article contributes to the understanding of embodied practices and experiences within adapted physical activity. It presents a study of a 4-day winter sports camp for young people with cerebral palsy. The experiences of the participants were investigated through qualitative interviews. The findings are analyzed through a phenomenological framework of embodiment and the notions of body schema and body image. By paying special attention to the bodily experience of "I can," this study shows that participants learned new ways of approaching challenges, gained bodily control in challenging situations, expanded their fields of possible actions through practicing, as well as learned to understand and accept themselves. These findings reveal central values of bodily interventions for people with cerebral palsy and have the potential to inform pedagogical work within the area of adapted physical activity.

[PMID: 28942669](#)

7. A Comparative Study of Sagittal Balance in Patients with Neuromuscular Scoliosis.

Borges PA, Zelada FGB, Dos Santos Barros TF, Letaif OB, da Rocha ID, Marcon RM, Cristante AF, Barros-Filho TEP.

Clinics (Sao Paulo). 2017 Aug;72(8):481-484. doi: 10.6061/clinics/2017(08)05.

OBJECTIVES: Spinopelvic alignment has been associated with improved quality of life in patients with vertebral deformities, and it helps to compensate for imbalances in gait. Although surgical treatment of scoliosis in patients with neuromuscular spinal deformities promotes correction of coronal scoliotic deformities, it remains poorly established whether this results in large changes in sagittal balance parameters in this specific population. The objective of this study is to compare these parameters before and after the current procedure under the hypothesis is that there is no significant modification. **METHODS:** Sampling included all records of patients with neuromuscular scoliosis with adequate radiographic records treated at Institute of Orthopedics and Traumatology of Clinics Hospital of University of São Paulo (IOT-HCFMUSP) from January 2009 to December 2013. Parameters analyzed were incidence, sacral inclination, pelvic tilt, lumbar lordosis, thoracic kyphosis, spinosacral angle, spinal inclination and spinopelvic inclination obtained using the iSite-Philips digital display system with Surgimap and a validated method for digital measurements of scoliosis radiographs. Comparison between the pre- and post-operative conditions involved means and standard deviations and the t-test. **RESULTS:** Based on 101 medical records only, 16 patients met the inclusion criteria for this study, including 7 males and 9 females, with an age range of 9-20 and a mean age of 12.9±3.06; 14 were diagnosed with cerebral palsy. No significant differences were found between pre and postoperative parameters. **CONCLUSIONS:** Despite correction of coronal scoliotic deformity in patients with neuromuscular deformities, there were no changes in spinopelvic alignment parameters in the group studied.

[PMID: 28954007](#)

8. Bony reconstruction of hip in cerebral palsy children Gross Motor Function Classification System levels III to V: a systematic review.

El-Sobky TA, Fayyad TA, Kotb AM, Kaldas B.

J Pediatr Orthop B. 2017 Sep 25. doi: 10.1097/BPB.0000000000000503. [Epub ahead of print]

Hip dislocation is a common source of disability in cerebral palsy children. It has been remedied by various reconstructive procedures. This review aims at providing the best evidence for bony reconstructive procedures in cerebral palsy hip migration. The literature extraction process yielded 36 articles for inclusion in this review. There is fair evidence to indicate that the comparative effectiveness of femoral versus combined pelvifemoral reconstruction favours pelvifemoral reconstruction. All except one were retrospective articles with a significant degree of selection and performance bias and confounding variables that limited the validity and generalizability of the conclusions. The findings of this systematic review provide fair evidence for the use of adequate soft tissue and combined pelvifemoral reconstruction in the management of hip migration in none and minimally ambulatory cerebral palsy children in the short and long term. This has been shown in studies with a summed sizable patient population. There is limited evidence available that would support the use of soft-tissue and isolated femoral reconstruction. In the context of these retrospective and biased studies, it is extremely difficult to identify, with great precision,

predictors of surgical success. Future studies should consider prospective designs that allow for bias control, strict patient selection criteria and incorporation of validated quality-of-life scales.

[PMID: 28953164](#)

9. Evidence of knee extensor dysfunction during sit-to-stand following distal femoral extension osteotomy and patellar tendon advancement in young adults with cerebral palsy: A pilot study.

Boyer ER, Stout JL, Laine JC, Gutknecht SM, Oliveira LH, Munger ME, Schwartz MH, Novacheck TF.

Gait Posture. 2017 Sep 19;58:527-532. doi: 10.1016/j.gaitpost.2017.09.018. [Epub ahead of print]

A distal femoral extension osteotomy with patellar tendon advancement (DFEO+PTA) is a common treatment for individuals with cerebral palsy (CP) who walk in crouch. Musculoskeletal modeling suggests that the typical patella baja position post-DFEO+PTA may limit one's abilities to perform sit-to-stand (STS) tasks; however, STS function has not been assessed. Our purpose was to compare how well individuals who received a DFEO+PTA can perform a 5-times STS test (FTSST) eight or more years after surgery compared to their peers who did not receive a DFEO+PTA (non-DFEO+PTA group). Twenty-one participants completed the task (12 DFEO+PTA, 9 non-DFEO+PTA). Three-dimensional kinematics and kinetics were captured. Kinetics were non-dimensionalized to facilitate group comparisons. Non-DFEO+PTA participants performed the FTSST moderately faster than the DFEO+PTA group (median(IQR), 14.6(9.3) seconds vs. 20.3(10.1) seconds, non-parametric effect size $\gamma=0.97$, $p=0.241$). Peak negative knee power was larger for the non-DFEO+PTA group (Mean \pm SD, -0.063 ± 0.025 vs. -0.048 ± 0.020 , Cohen's $d=0.66$, $p=0.165$). A similar but weaker trend was observed for negative hip power (median(IQR) $-0.120(0.066)$ vs. $-0.105(0.044)$, $\gamma=0.43$, $p=0.671$). Both groups used their hips approximately twice as much as their knees to perform the task. The functional deficit among DFEO+PTA participants may be due to patella baja decreasing the knee extensor moment arm, which concurs with the modeling prediction. The group differences may also be due to the non-DFEO+PTA group being slightly higher functioning. Future research is warranted to determine if optimizing patella position during a DFEO+PTA may improve unaided STS function without compromising gait improvements.

[PMID: 28961550](#)

10. Should Proximal Femoral Implants be Removed Prophylactically or Reactively in Children With Cerebral Palsy?

Truong WH, Novotny SA, Novacheck TF, Shin EJ, Howard A, Narayanan UG.

J Pediatr Orthop. 2017 Sep 22. doi: 10.1097/BPO.0000000000001082. [Epub ahead of print]

BACKGROUND: Implants are commonly used to stabilize proximal femoral osteotomies in children with cerebral palsy (CP). Removal of implants is common practice and believed to avoid infection, fracture, or pain that might be associated with retained hardware. There is little evidence to support a prophylactic strategy over a reactive approach based on symptoms. The aim of this study was to compare the outcomes of prophylactic and reactive approaches to removal of proximal femoral implants in children with CP. **METHODS:** An intention-to-treat model was used to compare 2 institutions that followed a prophylactic (within ~ 1 y) and reactive (following complication/symptoms) approach to hardware removal, respectively. Patients with CP who had femoral implants placed at or before age 16, and had ≥ 2 -year postsurgical follow-up were included. Demographics, surgical details, reasons for removal, and complications were recorded. χ and t tests were used. **RESULTS:** Six hundred twenty-one patients (prophylactic=302, reactive=319) were followed for an average of 6 years (range, 2 to 17 y). Two hundred eighty-seven (95%) implants were removed in the prophylactic group at 1.2 years. In the reactive group, 64 (20%) implants were removed at an average of 4.2 years. Reasons for removal included pain; infection; fracture; or for repeat reconstruction. The rate of unplanned removals due to fracture or infection was higher in the reactive group (4.7% vs. 0.7%, $P=0.002$), but there was no difference in the rate of complications during/after removal between the 2 groups (1.7% vs. 3.1%; $P=0.616$). No specific risk factor associated with unplanned removal could be identified; but children under 8 years old seemed more likely to undergo later removal (odds ratio 1.98; 95% confidence interval, 0.99-3.99). **CONCLUSIONS:** Eighty percent of patients in the reactive removal strategy avoided surgery. This group did have a 4% higher rate of fracture or infection necessitating unplanned removal but these were successfully treated at time of removal with no difference in complication rates associated with removal between both groups. One would need to remove implants from 25 patients to avoid 1 additional complication, providing some support for a reactive approach to removal of proximal femoral implants in this population.

[PMID: 28945691](#)

11. Value of botulinum toxin injections preceding a comprehensive rehabilitation period for children with spastic cerebral palsy: a cost-effectiveness study.

Schasfoort F, Dallmeijer A, Pangalila R, Catsman C, Stam H, Becher J, Steyerberg E, Polinder S, Bussmann J.

J Rehabil Med. 2017 Sep 26. doi: 10.2340/16501977-2267. [Epub ahead of print]

OBJECTIVE: Despite the widespread use of botulinum toxin in ambulatory children with spastic cerebral palsy, its value prior to intensive physiotherapy with adjunctive casting/orthoses remains unclear. **DESIGN:** A pragmatically designed, multi-centre trial, comparing the effectiveness of botulinum toxin + intensive physiotherapy with intensive physiotherapy alone, including economic evaluation. **SUBJECTS/PATIENTS:** Children with spastic cerebral palsy, age range 4-12 years, cerebral palsy-severity Gross Motor Function Classification System levels I-III, received either botulinum toxin type A + intensive physiotherapy or intensive physiotherapy alone and, if necessary, ankle-foot orthoses and/or casting. **METHODS:** Primary outcomes were gross motor function, physical activity levels, and health-related quality-of-life, assessed at baseline, 12 (primary end-point) and 24 weeks (follow-up). Economic outcomes included healthcare and patient costs. Intention-to-treat analyses were performed with linear mixed models. **RESULTS:** There were 65 participants (37 males), with a mean age of 7.3 years (standard deviation 2.3 years), equally distributed across Gross Motor Function Classification System levels. Forty-one children received botulinum toxin type A plus intensive physiotherapy and 24 received intensive physiotherapy treatment only. At primary end-point, one statistically significant difference was found in favour of intensive physiotherapy alone: objectively measured percentage of sedentary behaviour (-3.42, 95% confidence interval 0.20-6.64, $p=0.038$). Treatment costs were significantly higher for botulinum toxin type A plus intensive physiotherapy (8,963 vs 6,182 euro, $p=0.001$). No statistically significant differences were found between groups at follow-up. **CONCLUSION:** The addition of botulinum toxin type A to intensive physiotherapy did not improve the effectiveness of rehabilitation for ambulatory children with spastic cerebral palsy and was also not cost-effective. Thus botulinum toxin is not recommended for use in improving gross motor function, activity levels or health-related quality-of-life in this cerebral palsy age- and severity-subgroup.

[PMID: 28949368](#)

12. The effect of plantar flexor lengthening on foot pressure in ambulatory children with cerebral palsy.

Abousamra O, Schwartz J, Church C, Lennon N, Henley J, Niiler T, Miller F.

J Pediatr Orthop B. 2017 Sep 25. doi: 10.1097/BPB.0000000000000501. [Epub ahead of print]

This study aimed to assess the effects of plantar flexor lengthening (PFL) on dynamic foot pressures of children with cerebral palsy using pedobarographs. Of 97 enrolled, 13 children with 18 legs had PFL. Age at surgery was 4.7 (2.8-8.8) years. A significant increase in ankle dorsiflexion and heel impulse was achieved postoperatively and was maintained at 5 years. The coronal plane pressure index increased postoperatively, but reverted to preoperative levels at the 5-year follow-up. Children tend to have more valgus after PFL. In young children, there caution should be exercised to avoid over treating varus at the time of equinus correction to avoid overcorrection.

[PMID: 28953163](#)

13. Comparative study on gastrostomy and orally nutrition of children and adolescents with tetraparesis cerebral palsy.

Caselli TB, Lomazi EA, Montenegro MAS2, Bellomo-Brandão MA.

Arq Gastroenterol. 2017 Sep 21:0. doi: 10.1590/S0004-2803.201700000-48. [Epub ahead of print]

BACKGROUND: Gastrostomy tube feeding (GTF) is indicated for children with feeding difficulties due to tetraspastic cerebral palsy, although there are no definitive conclusions about the benefits of GTF. **OBJECTIVE:** To compare nutritional status and diet of pediatric patients with tetraparesis cerebral palsy who are fed by GTF with those fed orally (PO). **METHODS:** A transversal and descriptive study on 54 patients with spastic tetraparesis was held. The referred parameters were: weight, knee height and estimated height, cutaneous folds and circumferences. The Frisancho reference was used to compare the skin folds and body circumferences. The Brooks et al. curve was adopted as a reference for weight, height, and BMI. Food inquiry was performed using the Habitual Dietary Recall method. The total energetic value (TEV) of macronutrients and fibers was performed by Avanutri® version 4.0, a nutrition software program. The differences of nutritional parameters between the GTF and the PO groups were calculated by chi-squared and Fisher's exact tests, and the comparison between the groups for variable numbers was performed using the Mann-Whitney test. The significance level adopted was 5%.

RESULTS: The PO group presented more individuals in the malnourished range (24.14%) and high levels of adipose and thin mass depletion. The ingestion of lipids was larger in the GTF group, even though the proteins and fibers were higher in the PO group. The comparison between the diets in the GTF group indicated that the mixed diet (industrialized and artisanal) supplied a greater contribution of proteins and fibers. CONCLUSION: Comparing the groups, the tetraparesis cerebral palsy patients fed orally have a greater impairment of their nutritional status, even though they have higher intakes of protein and fiber than those patients fed by gastrostomy, demonstrating a consistent argument for the use of gastrostomy.

[PMID: 28954047](#)

14. Comparing behavioral treatment of feeding difficulties and tube dependence in children with cerebral palsy and autism spectrum disorder.

Taylor T, Kozlowski AM, Girolami PA.

NeuroRehabilitation. 2017 Sep 16. doi: 10.3233/NRE-162071. [Epub ahead of print]

BACKGROUND: Feeding disorders are multifaceted with behavioral components often contributing to the development and continuation of food refusal. In these cases, behavioral interventions are effective in treating feeding problems, even when medical or oral motor components are also involved. Although behavioral interventions for feeding problems are frequently employed with children with autism, they are less commonly discussed for children with cerebral palsy. OBJECTIVE: The purpose of this study was to compare the effectiveness of using applied behavior analytic interventions to address feeding difficulties and tube dependence in children with autism and children with cerebral palsy. METHOD: Children ages 1 to 12 years who were enrolled in an intensive feeding program between 2003 and 2013, where they received individualized behavioral treatment, participated. RESULTS: Behavioral treatment components were similar across groups, predominately consisting of escape extinction (e.g., nonremoval of the spoon) and differential reinforcement. For both groups, behavioral treatment was similarly effective in increasing gram consumption and in decreasing refusal and negative vocalizations. A high percentage of individualized goals were met by both groups as well as high caregiver satisfaction reported. CONCLUSIONS: Behavioral interventions for food refusal are effective for children with cerebral palsy with behavioral refusal, just as they are for children with autism.

[PMID: 28946574](#)

15. Therapy access among children with autism spectrum disorder, cerebral palsy, and attention-deficit-hyperactivity disorder: a population-based study.

Benevides TW, Carretta HJ, Ivey CK, Lane SJ.

Dev Med Child Neurol. 2017 Sep 21. doi: 10.1111/dmcn.13560. [Epub ahead of print]

AIM: This study examined cross-sectional population-based rates in reported need and unmet need for occupational, physical, and speech therapy services in children with autism spectrum disorder (ASD) compared with children with attention-deficit-hyperactivity disorder (ADHD) and cerebral palsy (CP). METHOD: The 2005-2006 and 2009-2010 (USA) National Survey of Children with Special Health Care data sets were used to compare therapy need and unmet need among children younger than 18 years with ASD (n=5178), ADHD (n=20 566), and CP (n=1183). Bivariate approaches and multivariate logistic regression using imputed data were used to identify associations between child and family characteristics, and access to therapy services. RESULTS: After adjusting for other variables, children with ASD had a significantly greater likelihood of having an unmet therapy need compared with children with ADHD (odds ratio [OR] 1.66, 95% confidence interval [CI] 1.36-2.03), but a similar unmet need as children with CP (OR 1.30, 95% CI 0.97-1.74). Factors associated with unmet need included survey year, younger child age, no health insurance, and increased functional and behavioral difficulties. INTERPRETATION: Children in our sample had greater unmet therapy needs in 2009 than in 2005. Caregiver-reported reasons for unmet need included cost and school resources. Research examining future trends in therapy access are warranted for children with ASD and CP.

[PMID: 28940224](#)

16. A User-Centered Approach: Understanding Client and Caregiver Needs and Preferences in the Development of mHealth Apps for Self-Management.

Bendixen RM, Fairman AD, Karavolis M, Sullivan C, Parmanto B.

JMIR Mhealth Uhealth. 2017 Sep 26;5(9):e141. doi: 10.2196/mhealth.7136.

BACKGROUND: Many adolescents and young adults with chronic illness or disability often fail to develop the self-management skills necessary to independently handle medical and self-management routines. In light of these needs, we are developing iMHere 2.0 (Interactive Mobile Health and Rehabilitation), a mobile health (mHealth) system to support a self-management program. **OBJECTIVE:** Our objective was to gather data from persons with brain and spinal cord anomalies (BSA) and their caregivers to better understand how mHealth would be most helpful in supporting them to proactively manage daily self-care routines and to access medical care as needed. The specific purpose was not only to gather feedback and to gain increased insight into the design of the new version of iMHere, but also to gather perspectives of new groups, namely adolescents as young as 12 years and their parents and/or caregivers. **METHODS:** Our project employed focus group sessions and surveys to collect data from participants with BSA, as well as their caregivers. A total of six focus group sessions were conducted on four separate occasions until the data gathered reached saturation. The objectives of our focus group sessions were to better understand ways to develop mHealth systems to support self-management, to promote independence, to motivate long-term system use, and to prevent medical problems that lead to hospitalizations and emergency room visits for youth and young adults with BSA. **RESULTS:** A total of 16 youth and young adults with BSA and 11 caregivers participated in the sessions. Within and among our groups, the following five overarching themes emerged from the data: (1) make it easy, (2) engage, (3) educate and prepare, (4) motivate and support, and (5) personalize. Participants shared their perspectives and detailed information about mHealth apps that would be important for independence in self-care and self-management. **CONCLUSIONS:** Our findings suggest that most individuals keep their mobile phones with them at all times and typically use a mobile phone for social media, music, photos, and texting. Our qualitative analysis indicates that youth and young adults with BSA, as well as their caregivers, acknowledge the importance of being actively engaged in developing and using mHealth apps that monitor and manage their health care needs. Information gleaned from these focus group sessions and surveys have provided data to refine the iMHere 2.0 mHealth prototype platform that we have developed.

[PMID: 28951378](#)

17. A Parental Report of Youth Transition Readiness: The Parent STARx Questionnaire (STARx-P) and Re-evaluation of the STARx Child Report.

Nazareth M, Hart L, Ferris M, Rak E, Hooper S, van Tilburg MAL.

J Pediatr Nurs. 2017 Sep 20. pii: S0882-5963(17)30093-3. doi: 10.1016/j.pedn.2017.08.033. [Epub ahead of print]

PURPOSE: The STARx Questionnaire is a self-report measure of health care transition (HCT) readiness in youth with chronic diseases. We aimed to improve reliability and generalizability of the STARx and report initial reliability data on the STARx-P Questionnaire, a self-report measure of parent perspective on their child's HCT readiness. **METHODS:** Participants were recruited in several clinics from a large academic hospital in the southeastern USA and via the therapeutic summer camp for children with chronic disease. Children with chronic conditions responded to the 18-question STARx Questionnaire and their parents responded to the parent version, the STARx-P Questionnaire. **RESULTS:** IRB-approved consents were obtained from 341 parents (89.4% mothers) and 455 children (Mean age 12.28±2.53; 36.9% Males; 68.6% Caucasian; 22.6% African-American). The most common diagnoses were kidney disease, inflammatory bowel disease, diabetes, cerebral palsy, sickle cell, and cystic fibrosis. Principal component analysis of the STARx-P Questionnaire identified three major subscales in both the child and parent-report: Disease Knowledge, Self-management and Provider Communication. Internal reliability was moderate to good ($\alpha=0.545-0.759$). **CONCLUSIONS:** The STARx-P Questionnaire and STARx Version 4 Questionnaire have demonstrated initial reliability in this multi-institution study. It is the first HCT readiness questionnaire that includes a parent-proxy report which is needed in studies of non-verbal and/or developmentally delayed children. Parent-report can also give unique insights not obtained from self-reports.

[PMID: 28941954](#)

18. Compiling standardized information from clinical practice: using content analysis and ICF Linking Rules in a goal-oriented youth rehabilitation program.

Lustenberger NA, Prodinger B, Dorjbal D, Rubinelli S, Schmitt K, Scheel-Sailer A.

Disabil Rehabil. 2017 Sep 23;1-9. doi: 10.1080/09638288.2017.1380718. [Epub ahead of print]

PURPOSE: To illustrate how routinely written narrative admission and discharge reports of a rehabilitation program for eight youths with chronic neurological health conditions can be transformed to the International Classification of Functioning, Disability and Health. **METHODS:** First, a qualitative content analysis was conducted by building meaningful units with text segments assigned of the reports to the five elements of the Rehab-Cycle®: goal; assessment; assignment; intervention; evaluation. Second, the meaningful units were then linked to the ICF using the refined ICF Linking Rules. **RESULTS:** With the first step of transformation, the emphasis of the narrative reports changed to a process oriented interdisciplinary layout, revealing three thematic blocks of goals: mobility, self-care, mental, and social functions. The linked 95 unique ICF codes could be grouped in clinically meaningful goal-centered ICF codes. Between the two independent linkers, the agreement rate was improved after complementing the rules with additional agreements. **CONCLUSIONS:** The ICF Linking Rules can be used to compile standardized health information from narrative reports if prior structured. The process requires time and expertise. To implement the ICF into common practice, the findings provide the starting point for reporting rehabilitation that builds upon existing practice and adheres to international standards. **Implications for Rehabilitation** This study provides evidence that routinely collected health information from rehabilitation practice can be transformed to the International Classification of Functioning, Disability and Health by using the "ICF Linking Rules", however, this requires time and expertise. The Rehab-Cycle®, including assessments, assignments, goal setting, interventions and goal evaluation, serves as feasible framework for structuring this rehabilitation program and ensures that the complexity of local practice is appropriately reflected. The refined "ICF Linking Rules" lead to a standardized transformation process of narrative text and thus a higher quality with increased transparency. As a next step, the resulting format of goal codes supplemented by goal-clarifying codes could be validated to strengthen the implementation of the International Classification of Functioning, Disability and Health into rehabilitation routine by respecting the variety of clinical practice.

[PMID: 28944699](#)

19. Are we there yet? Celebrating progress in cerebral palsy research.

Ellenson R.

Dev Med Child Neurol. 2017 Oct;59(10):987. doi: 10.1111/dmcn.13542.

[No abstract available]

[PMID: 28940188](#)

Prevention and Cure

20. Reduced infancy and childhood epilepsy following hypothermia-treated neonatal encephalopathy.

Liu X, Jary S, Cowan F, Thoresen M.

Epilepsia. 2017 Sep 29. doi: 10.1111/epi.13914. [Epub ahead of print]

OBJECTIVE: To investigate what proportion of a regional cohort of cooled infants with neonatal encephalopathy develop epilepsy (determined by the International League Against Epilepsy [ILAE] definition and the number of antiepileptic drugs [AEDs]) up to 8 years of age. **METHODS:** From 2006-2013, 151 infants with perinatal asphyxia underwent 72 h cooling. Clinical and amplitude-integrated electroencephalography (aEEG) with single-channel EEG-verified neonatal seizures were treated with AEDs. Brain magnetic resonance imaging (MRI) was assessed using a 0-11 severity score. Postneonatal seizures, epilepsy rates, and AED treatments were documented. One hundred thirty-four survivors were assessed at 18-24 months; adverse outcome was defined as death or Bayley III composite Cognition/Language or Motor scores <85 and/or severe cerebral palsy or severely reduced vision/hearing. Epilepsy rates in 103 children age 4-8 years were also documented. **RESULTS:** aEEG

confirmed seizures occurred precooling in 77 (57%) 151 of neonates; 48% had seizures during and/or after cooling and received AEDs. Only one infant was discharged on AEDs. At 18-24 months, one third of infants had an adverse outcome including 11% mortality. At 2 years, 8 (6%) infants had an epilepsy diagnosis (ILAE definition), of whom 3 (2%) received AEDs. Of the 103 4- to 8-year-olds, 14 (13%) had developed epilepsy, with 7 (7%) receiving AEDs. Infants/children on AEDs had higher MRI scores than those not on AEDs (median [interquartile range] 9 [8-11] vs. 2 [0-4]) and poorer outcomes. Nine (64%) of 14 children with epilepsy had cerebral palsy compared to 13 (11%) of 120 without epilepsy, and 10 (71%) of 14 children with epilepsy had adverse outcomes versus 23 (19%) of 120 survivors without epilepsy. The number of different AEDs given to control neonatal seizures, aEEG severity precooling, and MRI scores predicted childhood epilepsy. SIGNIFICANCE: We report, in a regional cohort of infants cooled for perinatal asphyxia, 6% with epilepsy at 2 years (2% on AEDs) increasing to 13% (7% on AEDs) at early school age. These AED rates are much lower than those reported in the cooling trials, even with adjusting for our cohort's milder asphyxia. Long-term follow-up is needed to document final epilepsy rates.

[PMID: 28961316](#)

21. Neurological complications after therapy for fetal-fetal transfusion syndrome: a systematic review of the outcomes at 24 months.

Miralles-Gutiérrez A, Narbona-Arias I, González-Mesa E.

J Perinat Med. 2017 Sep 29. pii: /j/jpme.ahead-of-print/jpm-2017-0217/jpm-2017-0217.xml. doi: 10.1515/jpm-2017-0217. [Epub ahead of print]

OBJECTIVE: The main objective of this study was to review the available scientific evidence about mid-term neurological outcomes in twins after laser therapy for twin-to-twin transfusion syndrome (TTTS). METHODS: A systematic review of studies on neurodevelopmental outcomes (cognition, motor development, communication skills and cerebral palsy) of twins after laser therapy for TTTS was conducted. Outcomes at 24 months of age and the use of validated scales for assessment were the selected criteria. Electronic and manual research identified 25 studies, and nine of them were eligible for the review. RESULTS: The global mean rate of neurological injury in twins treated with laser was 14.07%. The mean rate of cognitive impairment was 8.41%, 11.14% for motor delay, 16.5% for communication delay and 5.73% for cerebral palsy. These rates were higher than the results found in dichorionic twins, but lower than the results found in twins treated with amnio-reductions or conservative management. CONCLUSION: Laser therapy is associated with a lower rate of neurological injury at 24 months of age compared to other therapeutic techniques. This tendency was also observed with specific incidences regarding cognition, motor skills and cerebral palsy.

[PMID: 28961141](#)

22. Evaluating a Targeted Bedside Measure of Cerebral Perfusion in a Nonhuman Primate Model of Neonatal Hypoxic-Ischemic Encephalopathy.

Peeples ES, Ezeokeke CK, Juul SE, Mourad PD.

J Ultrasound Med. 2017 Sep 29. doi: 10.1002/jum.14426. [Epub ahead of print]

OBJECTIVES: To compare ultrasound-derived resistive indices (RIs) obtained at the level of the thalamus via fast Doppler ultrasound with traditional anterior cerebral artery measures in a model of neonatal hypoxic-ischemic encephalopathy and to correlate each with clinical outcomes. METHODS: Nine nonhuman primate neonates underwent no umbilical cord occlusion (n = 3), umbilical cord occlusion without hypothermia (n = 3), or umbilical cord occlusion with hypothermia (n = 3). The RI was measured in the anterior cerebral artery and thalamus on days 0, 1, and 4 of life. Magnetic resonance imaging with spectroscopy was performed on day 4. RESULTS: Mean thalamus and anterior cerebral artery RI values in the first 36 hours of life were statistically different in neonates who died (+0.13; P = .019) or developed cerebral palsy (-0.08; P = .003). Thalamic RI values showed stronger associations with serum and spectroscopic lactate values than those in the anterior cerebral artery. The umbilical cord occlusion-with-hypothermia group showed a significant increase in the RI in the thalamus but not the anterior cerebral artery. CONCLUSIONS: Resistive index measurements in the thalamus may eventually supplement other bedside measures for predicting outcomes in the HIE population, but further studies need to differentiate the effect of hypothermia from illness severity on thalamic perfusion.

[PMID: 28960438](#)

23. Changes in spectroscopic biomarkers after transcranial direct current stimulation in children with perinatal stroke.

Carlson HL, Ciechanski P, Harris AD, MacMaster FP, Kirton A.

Brain Stimul. 2017 Sep 13. pii: S1935-861X(17)30899-9. doi: 10.1016/j.brs.2017.09.007. [Epub ahead of print]

BACKGROUND: Perinatal stroke causes lifelong motor disability, affecting independence and quality of life. Non-invasive neuromodulation interventions such as transcranial direct current stimulation (tDCS) combined with intensive therapy may improve motor function in adult stroke hemiparesis but is under-explored in children. Measuring cortical metabolites with proton magnetic resonance spectroscopy (MRS) can inform cortical neurobiology in perinatal stroke but how these change with neuromodulation is yet to be explored. **METHODS:** A double-blind, sham-controlled, randomized clinical trial tested whether tDCS could enhance intensive motor learning therapy in hemiparetic children. Ten days of customized, goal-directed therapy was paired with cathodal tDCS over contralesional primary motor cortex (M1, 20 min, 1.0 mA, 0.04 mA/cm²) or sham. Motor outcomes were assessed using validated measures. Neuronal metabolites in both M1s were measured before and after intervention using fMRI-guided short-echo 3T MRS. **RESULTS:** Fifteen children [age(range) = 12.1(6.6-18.3) years] were studied. Motor performance improved in both groups and tDCS was associated with greater goal achievement. After cathodal tDCS, the non-lesioned M1 showed decreases in glutamate/glutamine and creatine while no metabolite changes occurred with sham tDCS. Lesioned M1 metabolite concentrations did not change post-intervention. Baseline function was highly correlated with lesioned M1 metabolite concentrations (N-acetyl-aspartate, choline, creatine, glutamate/glutamine). These correlations consistently increased in strength following intervention. Metabolite changes were not correlated with motor function change. Baseline lesioned M1 creatine and choline levels were associated with clinical response. **CONCLUSIONS:** MRS metabolite levels and changes may reflect mechanisms of tDCS-related M1 plasticity and response biomarkers in hemiparetic children with perinatal stroke undergoing intensive neurorehabilitation.

[PMID: 28958737](#)

24. Optimal timing of delivery for women with breast cancer, according to cancer stage and hormone status: a decision-analytic model.

Kuo K, Caughey AB.

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OBJECTIVE: To compare strategies for the timing of delivery in women with breast cancer and known cancer stage or hormone receptor subtype, and to determine the optimal gestational age for induction in regards to maternal-fetal outcomes. **STUDY DESIGN:** A decision-analytic model was designed comparing eight different strategies for scheduled delivery at 30, 31, 32, 33, 34, 35, 36, and 37 weeks gestation. Optimal breast cancer treatment was assumed to be delayed until after delivery. Baseline estimates of the stage- and subtype-specific mortality and the impact of delayed cancer treatment on 5-year survival rates were obtained from the literature. Outcomes factored into the model included the risk of intrauterine fetal demise, spontaneous delivery, respiratory distress syndrome, cerebral palsy, and neonatal demise at each gestational age. Univariate sensitivity analyses and Monte Carlo simulations were performed to test the robustness of our model. **RESULTS:** For women with stage I-II breast cancer, delivery at 36 weeks yielded the highest number of overall quality-adjusted life years (QALYs), while maternal QALYs were maximized with delivery at 34 weeks. For stage III and IV disease, maternal QALYs were maximized at 31 and 30 weeks, respectively. For women with estrogen or progesterone receptor-positive, human epidermal receptor-2 negative breast cancer, both maternal QALYs and overall QALYs were maximized with delivery at 36 weeks. More aggressive biological phenotypes were similarly associated with optimal delivery at decreasing gestational age. Our model was heavily driven by the baseline probability of maternal death within 5 years, in addition to the expected progression of disease and decreases in survival rates with each week of non-treatment, and remained robust across reasonable ranges for all variables of interest. **CONCLUSIONS:** For women with breast cancer diagnosed during pregnancy, decisions regarding timing of delivery should take into consideration both cancer stage and hormone receptor subtype.

[PMID: 28954567](#)

25. From "Apparent Death" to "Birth Asphyxia": a history of blame.

Obladen M.

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Since the 16th century, competition between midwives and surgeons has created a culture of blame around the difficult delivery. In the late 17th century, 100 years before oxygen was discovered, researchers associated "apparent death of the newborn" with impaired respiratory function of the placenta. The diagnosis "birth asphyxia" replaced the term "apparent death of the newborn" during the mass phobia of being buried alive in the 18th century. This shifted the interpretation from unavoidable fate to a preventable condition. Although the semantic inaccuracy ("pulselessness") was debated, "asphyxia" was not scientifically defined until 1992. From 1792 the diagnosis was based on a lack of oxygen. "Blue" and "white" asphyxia were perceived as different disorders in the 18th, and as different grades of the same disorder in the 19th century. In 1862, William Little linked birth asphyxia with cerebral palsy, and although never confirmed, his hypothesis was accepted by scientists and the public. Fetal well-being was assessed by auscultating heart beats since 1822, and continuous electronic fetal monitoring was introduced in the 1960s without scientific assessment. It neither diminished the incidence of birth asphyxia nor of cerebral palsy, but rather raised the rate of Caesarean sections and litigation against obstetricians and midwives. Pediatric Research accepted article preview online, 27 September 2017. doi:10.1038/pr.2017.238.

[PMID: 28953855](#)