Cerebral palsy research news

Monday 30 August 2021

Cerebral Palsy Alliance is delighted to bring you this free weekly bulletin of the latest published research into cerebral palsy. Our organisation is committed to supporting cerebral palsy research worldwide - through information, education, collaboration and funding. Find out more at cerebralpalsy.org.au/our-research

Professor Nadia Badawi AM
CP Alliance Chair of Cerebral Palsy Research

Subscribe to CP Research News

Interventions and Management

1. Motor and functional outcome of selective dorsal rhizotomy in children with spastic diplegia at 12 and 24 months of follow-up
Tarik Alp Sargut, Hannes Haberl, Simone Wolter, Sascha Tafelski, Anne van Riesen, Maijana Linhard, Angela M Kaindl, Ulrich-Wilhelm Thomale, Matthias Schulz

Acta Neurochir (Wien). 2021 Aug 21. doi: 10.1007/s00701-021-04954-5. Online ahead of print.

Background: Selective dorsal rhizotomy (SDR) in ambulatory children affected by cerebral palsy (CP) is a surgical treatment option to lower spasticity and thereby improve gait and ambulation. The aim of the current study is to investigate the outcome of children with respect to spasticity, muscle strength, and overall function after SDR. Methods: All children who underwent SDR via a single-level laminotomy in the time period from January 2007 to April 2015 at our center were enrolled in this study. Within a standardized evaluation process, the following was assessed routinely pre-operatively and 12 and 24 months following surgery: extent of spasticity at hip adductors and hamstrings as characterized by the Modified Ashworth Scale (MAS), maximal muscle strength as characterized by the Medical Council Research Scale (MRC), overall function regarding ambulation as characterized by the Gross Motors Function Classification System (GFMCS), and overall function as characterized by the Gross Motor Function Measure (GMFM-88). Results: Matching sets of pre- and post-operative assessments of the chosen outcome parameters were available for 109 of the 150 children who underwent SDR within the observation period. After 24 months, the MAS scores of hip adductors ($n = 59$) improved in 71% and 76% of children on the right and left side, respectively. In 20% and 19%, it remained unchanged and worsened in 9% and 5% of children on the right and left side, respectively ($p < 0.00625$). For hamstrings, the rates for the right and left sides were 81% and 79% improvement, 16% and 16% unchanged, and 4% and 5% worsened, respectively ($p < 0.00625$). Muscle strength of ankle dorsiflexion and knee extension significantly improved after 24 months. Overall function assessed by GMFM-88 improved significantly by 4% after 12 months ($n = 77$) and by 7% after 24 months ($n = 56$, $p < 0.0001$). Conclusions: The presented data underlines the benefit of SDR in a pediatric patient collective with bilateral spastic CP. The procedure resulted in an effective and permanent reduction of spasticity and improved overall function without causing relevant weakness of the lower extremities.

PMID: 34417878

2. Effects of sensory cues on dynamic trunk control in children with spastic diplegic cerebral palsy
Nalin Khumlee, Duangporn Suriyaamarit, Sujitra Boonyong

Physiother Theory Pract. 2021 Aug 23;1-8. doi: 10.1080/09593985.2021.1967541. Online ahead of print.

Background: There is a lack of evidence whether the combined visual and verbal cues could improve dynamic trunk control in

the sitting position in children with spastic diplegic cerebral palsy (SDCP). Objective: To investigate the immediate effects of visual, verbal, and combined visual and verbal cues on dynamic trunk control in the sitting position in children with and without SDCP. Methods: Twenty children with SDCP and 20 typically developing (TD) children aged eight to 12 years in sitting positions maneuvered their trunks to lean forward, backward, to the left, and to the right under conditions of no sensory cues, visual cues, verbal cues, and combined visual and verbal cues. Dynamic trunk control in the sitting position was assessed using the center of force (CoF) trajectory and limit of stability (LOS). Results: Verbal cues and combined visual and verbal cues could improve CoF trajectories in the forward, backward, and leftward directions in TD children and children with SDCP. Combined visual and verbal cues could improve the LOS in both groups. Conclusion: This study provides evidence that combined visual and verbal cues are more effective at enhancing dynamic trunk control than either visual or verbal cues alone in TD children and children with SDCP.

PMID: 34424142

3. Femoral derotation osteotomy - does intraoperative electromagnetic tracking reflect the dynamic outcome?
Andreas Geisbüsch, Marco Götze, Cornelia Putz, Hartmut Dickhaus, Thomas Dreher

J Orthop Res. 2021 Aug 25. doi: 10.1002/jor.25168. Online ahead of print.

Femoral derotation osteotomy (FDO) is a well-established procedure for the correction of internal rotation gait in children with cerebral palsy. Various studies have demonstrated good results for FDO both in short term and long-term evaluation with some describing recurrence and over- or under-corrections. The present study evaluates the use of an objective intraoperative derotation measurement through electromagnetic tracking. We report the static and dynamic results of eleven cases with internal rotation gait (8 male, 3 female, mean age 22.2 years), that underwent femoral derotation osteotomy with intraoperative electromagnetic tracking and conventional goniometric measurement of the correction. The dynamic and static changes were assessed through three dimensional gait analysis after a mean of 12 month after surgery and rotational imaging pre- and after a mean of eleven days post-operatively. Mean hip rotation in stance significantly decreased from 20.9° (SD 5.9) to 5.8° (SD 4.7°) after FDO. The mean amount of derotation quantified by electromagnetic tracking was 23.2° (16.5-28.8°) and 25.1° (20.0-33.0°) for goniometric measurement. Both measurement modalities showed small differences to rotational imaging (EMT: 0.72°; Goniometer: 1.19°) but large deviation when compared to three dimensional gait analysis (EMT: 8.5°, Goniometer: 9.1°). In comparison to the static changes and EMT measurement, the dynamic changes measured during 3-D-gait analysis reflected only 66% of the actual derotation performed during surgery. While electromagnetic tracking allows a precise intraoperative assessment of the derotation during FDO, the amount of intraoperative correction is not reflected in the improvements in three dimensional gait analysis. This article is protected by copyright. All rights reserved.

PMID: 34432332

4. Multidimensional Effects of Solid and Hinged Ankle-Foot Orthosis in Children With Cerebral Palsy
Sivaporn Limpaninlachat, Saipin Prasertsukdee, Robert J Palisano, Joshua Burns, Jaranit Kaewkungwal, Rumrada Inthachom

Pediatr Phys Ther. 2021 Aug 18. doi: 10.1097/PEP.0000000000000826. Online ahead of print.

Purpose: To compare the effect of solid (SAFO) and hinged (HAFO) ankle-foot orthoses in children with cerebral palsy spastic diplegia and true equinus and jump gait. Methods: Participants were 26 children (13 wore SAFO and 13 wore HAFO) aged 4 to 14 years classified as Gross Motor Function Classification System levels I to III. Children were tested on standardized measures of body structure and function, activity, and participation. Results: Children wearing HAFO reached further in standing than those wearing SAFO. Among children who walked without an assistive device, children wearing HAFO had greater stride length and faster velocity. Mean Gross Motor Function Measure and Pediatric Evaluation of Disability Inventory mobility scores did not differ between groups. The cost-to-benefit ratios showed parents preferred HAFO. Conclusions: Among children with true equinus and jump gait, the effects of HAFO were greater in children who walked without an assistive mobility device.

PMID: 34417427

5. Commentary on "Multidimensional Effects of Solid and Hinged Ankle-Foot Orthosis in Children With Cerebral Palsy"
Hilal Keklicek, Aynur Demirel

Pediatr Phys Ther. 2021 Aug 18. doi: 10.1097/PEP.0000000000000830. Online ahead of print.

PMID: 34417431

6. Analysis of center of mass and center of pressure displacement in the transverse plane during gait termination in children with cerebral palsy
Minoru Kimoto, Kyoji Okada, Kazutaka Mitobe, Masachika Saito, Uki Kawanobe, Hitoshi Sakamoto

Gait Posture. 2021 Jul 24;90:106-111. doi: 10.1016/j.gaitpost.2021.07.015. Online ahead of print.

Background: While gait termination is challenging for children with spastic cerebral palsy (CCP), few studies have quantitatively assessed this issue. Research question: What are the characteristics of center of mass (COM) and center of pressure (COP) displacement during gait termination in CCP, and how do they compare with those in children with typical development (CTD)? Methods: This cross-sectional study included 13 adults with typical development (19.85 ± 0.52 years), 12 CTD (10.41 ± 2.98 years), and 16 CCP (11.15 ± 2.71 years). Participants were instructed to immediately stop walking when a stop sign appeared on a screen, which was placed at the end of an 8-m walkway. COM and COP were determined via 3-dimensional motion analysis and force plate data. Differences between the groups were assessed using the two sample t-test or Wilcoxon rank sum test. The level of statistical significance was set at $P < 0.05$. Results: The normalized time for stopping in CCP (4.556 ± 0.602) was higher than that in CTD (3.617 ± 0.545, $P < 0.001$). The normalized COP displacement ($P < 0.001$) and divergence between COM and COP ($P < 0.001$) in the mediolateral (ML) direction were significantly higher in CCP than CTD. However, the normalized divergence between COM and COP in the anteroposterior (AP) direction in CCP was lower than that in CTD ($P = 0.034$). Significance: The more minor divergence between COM and COP in the AP direction and the more significant COP displacement in the ML direction cause difficulty to exert braking force during gait termination. Thus, CCP require a longer time for gait termination. This finding may facilitate the development of interventions for improving gait in CCP.

PMID: 34438291

7. Weaker Connectivity of the Cortical Networks Is Linked with the Uncharacteristic Gait in Youth with Cerebral Palsy
Gaelle E Doucet, Sarah Baker, Tony W Wilson, Max J Kurz

Brain Sci. 2021 Aug 13;11(8):1065. doi: 10.3390/brainsci11081065.

Cerebral palsy (CP) is the most prevalent pediatric neurologic impairment and is associated with major mobility deficiencies. This has led to extensive investigations of the sensorimotor network, with far less research focusing on other major networks. The aim of this study was to investigate the functional connectivity (FC) of the main sensory networks (i.e., visual and auditory) and the sensorimotor network, and to link FC to the gait biomechanics of youth with CP. Using resting-state functional magnetic resonance imaging, we first identified the sensorimotor, visual and auditory networks in youth with CP and neurotypical controls. Our analysis revealed reduced FC among the networks in the youth with CP relative to the controls. Notably, the visual network showed lower FC with both the sensorimotor and auditory networks. Furthermore, higher FC between the visual and sensorimotor cortices was associated with larger step length ($r = 0.74$, $pFDR = 0.04$) in youth with CP. These results confirm that CP is associated with functional brain abnormalities beyond the sensorimotor network, suggesting abnormal functional integration of the brain's motor and primary sensory systems. The significant association between abnormal visuo-motor FC and gait could indicate a link with visuomotor disorders in this patient population.

PMID: 34439684

8. The association between motor capacity and motor performance in school-aged children with cerebral palsy: An observational study
Min-Hwa Suk, In-Kyeong Park, Soojin Yoo, Jeong-Yi Kwon

J Exerc Sci Fit. 2021 Oct;19(4):223-228. doi: 10.1016/j.jesf.2021.07.002. Epub 2021 Aug 3.

Background: This study aimed to investigate the association between motor capacity and motor performance in children with cerebral palsy (CP) aged 6-12 years with Gross Motor Function Classification System (GMFCS) levels I to III. Methods: Forty -six children with CP (24 boys and 22 girls) classified as GMFCS levels Ⅰ, Ⅱ, or Ⅲ were included. Motor capacity was measured by the Gross motor function measure (GMFM), Pediatric balance scale (PBS), Timed up and go (TUG), and 6-min walk test (6MWT). Motor performance was measured by triaxial accelerometers. Estimations of physical activity energy expenditure (PAEE) (kcal/kg/day), percentage of time spent on physical activity (% sedentary physical activity; %SPA; % light physical activity, %LPA; % moderate physical activity, %MPA; % vigorous physical activity %VPA; and moderate-to-vigorous physical activity, %MVPA), and activity counts (counts/minute) were obtained. Results: Children with GMFCS level I showed a significantly higher motor capacity (GMFM-66, GMFM-88, D-dimension and E-dimension, PBS and 6MWT) than those with level II or III. Children with GMFCS level II and/or III had significantly lower physical activity (PAEE, % MPA, % VPA, %MVPA, and activity counts) than children with GMFCS level I. Multiple linear regression analysis (dependent variable, GMFM-66) showed that %MVPA was positively associated with GMFM-66 in the GMFCS level II & III children but not in GMFCS level I children. Conclusions: These findings highlight the importance of increasing %MVPA in children with CP, especially GMFCS levels II and III.

PMID: 34447440

9. Evaluating a Therapeutic Powered Mobility Camp for Children with Severe Cerebral Palsy: Évaluation d'un camp thérapeutique de mobilité motorisée pour les enfants atteints de paralysie cérébrale grave
Lori Rosenberg, Adina Maeir, Yafit Gilboa

Can J Occup Ther. 2021 Aug 26;84174211034938. doi: 10.1177/00084174211034938. Online ahead of print.

Background. Children and youth with severe cerebral palsy (CP) have limited independent mobility, which affects opportunities for overall development. Purpose. To examine the effectiveness of Power Fun, a therapeutic powered mobility summer camp. Methods. A quasi-experimental, repeated-measure design was used, with participants acting as their own control. Twenty-four participants with severe CP (aged 7-20 years) attended Power Fun for three weeks, five days/week. Assessments of powered mobility skills and functional mobility goals were conducted three weeks before the camp (T1), at baseline (T2), postintervention (T3), and at three-week follow-up (T4). Findings. An analysis of variance results indicated significant improvements in powered mobility skills ($F(1,22) = 56.61$, $p < 0.001$, $\eta 2p = 0.74$) and functional mobility goals ($F(1,58) = 80.17$, $p < 0.001$, $\eta 2p = 0.74$), with 70% of goals achieved postintervention. A descriptive analysis revealed three learning profiles. Implications. This study provides initial evidence supporting the effectiveness of Power Fun as an intervention promoting powered mobility for children with severe CP, across a range of abilities.

PMID: 34435918

10. Task-specific training for bicycle-riding goals in ambulant children with cerebral palsy: a randomized controlled trial
Rachel A M Toovey, Adrienne R Harvey, Jennifer L McGinley, Katherine J Lee, Sophy T F Shih, Alicia J Spittle

Dev Med Child Neurol. 2021 Aug 22. doi: 10.1111/dmcn.15029. Online ahead of print.

Aim: To determine whether a task-specific physiotherapist-led training approach is more effective than a non-specific parent-led home programme for attaining bicycle-riding goals in ambulant children with cerebral palsy (CP). Method: Sixty-two ambulant children with CP aged 6 to 15 years (33 males, 29 females, mean age 9y 6mo) with bicycle-riding goals participated in this multi-centre, assessor-blind, parallel-group, superiority randomized controlled trial. Children in the task-specific group participated in a physiotherapist-led, group-based, intensive training programme. Children in the parent-led home group were provided with a practice schedule, generic written information, and telephone support. Both programmes involved a 1-week training period. The primary outcome was goal attainment at 1 week after training measured using the Goal Attainment Scale.

Secondary outcomes included bicycle skills, participation in bicycle riding, functional skills, self-perception, physical activity, and health-related quality of life at 1 week and 3 months after training. Results: Children in the task-specific training group had greater odds of goal attainment than those in the parent-led home programme at 1 week after intervention (odds ratio [OR] 10.4, 95% confidence interval [CI] 2.8-38.6), with evidence for superiority retained at 3 months (OR 4.0, 95% CI 1.3-12.5). Interpretation: The task-specific physiotherapist-led training approach was more effective for attaining bicycle-riding goals than a non-specific parent-led home programme in ambulant children with CP.

PMID: 34420205

11. Scootering for Children and Youth Is More Than Fun: Exploration of a Feasible Approach to Improve Function and Fitness
Marilyn Wright, Donna Twose, Jan Willem Gorter

Pediatr Phys Ther. 2021 Aug 24. doi: 10.1097/PEP.0000000000000829. Online ahead of print.

Purpose: Describe scootering as a physical therapy intervention for children/adolescents with mobility limitations within the "F-Words for Child Development" (fitness, function, family, friends, fun, and future) and through motion analysis. Methods: Perspectives of scootering were explored using the holistic "F-words for Child Development" recommendations for pediatric rehabilitation and through 3-dimensional instrumented motion analysis of children/adolescents with cerebral palsy and children/adolescents with typical development. Results: Scootering was consistent with the F-words tenets for rehabilitative best practice. Many of the motion characteristics of scootering reflected desirable exercise and gait attributes relevant to children/adolescents with cerebral palsy. Conclusions: Scootering is a feasible, functional, and fun activity that has the potential to address many aspects of fitness, function, and gait; meet the needs of families; and provide opportunities for interaction with friends. It is a physical therapy intervention that has the potential to contribute to future health and well-being of children with disabilities. Video abstract: For more insights from the authors, see Supplemental Digital Content 1, available at: http://links.lww.com/PPT/A331.

PMID: 34432761

12. Inverse T-shaped sternotomy as novel thoracoplasty for severe chest deformation and tracheal stenosis
Hirofumi Tomita, Akihiro Shimotakahara, Naoki Shimojima, Hideo Ishihama, Miki Ishikawa, Yuki Mizuno, Makoto Hashimoto, Ayano Tsukizaki, Kazuaki Miyaguni, Seiichi Hirobe

Surg Case Rep. 2021 Aug 26;7(1):194. doi: 10.1186/s40792-021-01275-8.

Background: Patients with severe motor and intellectual disabilities often suffer from tracheal stenosis due to chest deformation and brachiocephalic artery compression, which sometimes leads to serious complications, such as dying spell and tracheobrachiocephalic artery fistula. We herein described our experience of performing a novel and simple thoracoplastic procedure combined with brachiocephalic artery transection in two patients with severe chest deformation and tracheal stenosis. Case presentation: The patients were a 12-year-old female with cerebral palsy due to periventricular leukomalacia and a 21-year-old male with subacute sclerosing panencephalitis stage IV in the Jabbour classification following a laryngotracheal separation. Both patients showed severe chest deformation and symptoms of airway stenosis resulting in dying spells. The sternum was laterally transected between the manubrium and the sternal body, and a manubriotomy was performed longitudinally, ending with an inverse T-shaped sternotomy. Since the clavicle and the first rib remained attached to the halves of the divided manubrium, the sternum was allowed to be left open, resulting in improvement of the mediastinal narrowing and tracheal stenosis. Postoperative computed tomography (CT) showed that the distance between the halves of the manubrium was maintained at 10-11 mm, and that the mediastinal narrowing in both patients improved; the sternocervical spine distance increased from 20 mm to 22 and 13 mm to 16 mm, respectively. The patients' tracheal stenosis below the sternal end of the clavicle and the manubrium and respiratory symptoms improved, and the patients are currently at home in a stable condition with no chest fragility and no upper limb movement disorder 1 year after surgery. Conclusions: Our observations suggested that the inverse T-shaped sternotomy combined with brachiocephalic artery transection may relieve symptoms of tracheal stenosis due to severe chest deformation in patients with severe motor and intellectual disabilities.

PMID: 34436697

13. Acute colonic pseudo-obstruction (Ogilvie syndrome) leading to respiratory compromise and death
John Dewey, Joseph A Prahlow

Case Reports J Forensic Sci. 2021 Aug 23. doi: 10.1111/1556-4029.14827. Online ahead of print.

Here, we present an unusual case of acute colonic pseudo-obstruction (ACPO), also known as Ogilvie syndrome, which resulted in respiratory failure and sudden death. The patient was a 19-year-old man with a history of cerebral palsy (CP) and severe autism who experienced marked abdominal distension that progressed over several days in his skilled nursing facility. He developed shortness of breath and episodic diarrhea, before having an unwitnessed cardiac arrest and subsequently expiring after prehospital and emergency department care. Autopsy revealed developmental deformities consistent with CP, rectal prolapse, and significant abdominal distension. Postmortem radiography showed diffuse bowel distension with bilateral upward displacement of the diaphragm and consequent lung compression. Thorough examination of the gastrointestinal tract failed to reveal any perforation or obstruction. The cause of death was determined to be respiratory compromise secondary to diaphragmatic compression as a result of ACPO, a condition defined as colonic distension without a mechanical explanation for obstruction. This case highlights the challenges that ACPO can pose to a forensic pathologist at autopsy, and serves as a teaching point to clinicians on the warning signs and treatment measures for ACPO.

PMID: 34423848

14. Pyopneumothorax from coinfection by Trichomonas tenax and Geotrichum capitatum in a child from China: a case report
Yuhui Wu, Yuanzhen Ye, Yanlan Yang, Weiguo Yang, Jiayin Lin, Ke Cao

BMC Infect Dis. 2021 Aug 20;21(1):842. doi: 10.1186/s12879-021-06539-0.

Background: Trichomonas tenax may appear in the oral cavity of humans due to poor dentition or oral hygiene. Pyopneumothorax is a serious complication of lower respiratory tract infections that very rarely can be caused by a trichomonad species in predisposed individuals. We report a rare case of pleurisy due to T. tenax with coinfection by a fungus. Case presentation: We describe a 16-year-old patient with cerebral palsy who presented with severe pyopneumothorax. T. tenax was identified by microscopic examination of the pleural effusion and next-generation sequencing. We also identified Geotrichum capitatum in the pleural effusion and bronchoalveolar lavage fluid cultures. Treatment with voriconazole and metronidazole successfully eliminated these pathogens and relieved the clinical symptoms. A literature review indicated this is the first reported case of pleurisy due to T. tenax with coinfection by a fungus. Conclusion: The rarity of pyopneumothorax caused by T. tenax coinfection with a fungus should not be overlooked in the clinic. These patients should be and treated in a timely manner.

PMID: 34416850

15. Paediatric oral sensorimotor interventions for chewing dysfunction: A scoping review
Erin Wilson, Meg Simione, Lydia Polley

Review Int J Lang Commun Disord. 2021 Aug 22. doi: 10.1111/1460-6984.12662. Online ahead of print.

Background: Chewing dysfunction can have adverse effects on growth, development and quality of life. There is a lack of evidence-based consensus guidelines for sensorimotor intervention. To address this, we need to understand the current state of the science in clinical sensorimotor interventions for paediatric chewing dysfunction and systematically plan a research agenda and priorities for the field. Aims: The purpose of this scoping review was to examine the extent, range and nature of evidence for oral sensorimotor interventions for paediatric chewing dysfunction. Methods & procedures: This scoping review entailed five phases that included: identification of the research question; identification of relevant studies; study selection; data charting; and collation, summarization and report of the results. Treatment studies that were peer-reviewed and written in English were included. All studies involved a paediatric population and included an oral sensorimotor and/or chewing intervention. Information regarding study design, population, intervention, comparator, outcome measures and findings were extracted. Main contribution: Of the 21 studies included in this scoping review, 53% were specific to children with cerebral palsy. All interventions were multi-component in nature and the treatment studies included a range of study designs, but few

were controlled trials with comparators. A wide variety of outcomes measures were used within and across studies to determine treatment effectiveness. Conclusions & implications: The findings suggest that in a small number of studies, sensorimotor interventions provide preliminary evidence for effectiveness in specific populations. These and other treatment protocols must be trialled in additional clinical populations and settings to improve the evidence base for sensorimotor treatment of paediatric chewing dysfunction. This review also serves to help prioritize research agendas and further motivates the need for consensus-based clinical guidelines for paediatric chewing treatment. What this paper adds: What is already known on the subject Paediatric feeding disorders are highly prevalent and children often have chewing dysfunction that results in significant negative consequences. We lack evidence-based sensorimotor treatment approaches for chewing dysfunction, which directly impacts the care clinicians can provide children. What this study adds to existing knowledge This scoping review is the first step in examining the literature to understand the current state of the science for oral sensorimotor interventions for paediatric chewing dysfunction. Few randomized controlled studies were identified and a majority included children with cerebral palsy. Most of the interventions were multi-component and included a variety of treatment approaches. What are the potential or actual clinical implications of this work? The results of this scoping review can be used as an initial reference for clinicians selecting treatment approaches for chewing dysfunction. It also serves to help prioritize research agendas and further motivates the need for consensus-based clinical guidelines for paediatric chewing treatment.

PMID: 34423521

16. Dysphagia limit in children with cerebral palsy aged 4 to 12 years
Florentine V Schepers, Karen van Hulst, Bea Spek, Corrie E Erasmus, Lenie van den Engel-Hoek

Dev Med Child Neurol. 2021 Aug 21. doi: 10.1111/dmcn.15031. Online ahead of print.

Aim: To assess the dysphagia limit in children with cerebral palsy (CP) according to Eating and Drinking Ability Classification System (EDACS) level, sex, and age compared to typically developing children. Method: Seventy-seven children with CP (54 males, 23 females; mean age 7y 6mo, SD 2y 2mo, age range 4-12y) were assessed with the Maximum Volume Water Swallow Test. Median dysphagia limit in the CP group was compared with data of typically developing children. Results: The dysphagia limit of children with CP differed significantly ($p<0.001$) from typically developing children. The latter showed a threefold higher median dysphagia limit (22mL) compared to children with CP in EDACS level I (7mL). The higher the EDACS level, the lower the dysphagia limit in children with CP. EDACS level explained 55% of the variance in the dysphagia limit of the CP group. Interpretation: Where children with CP in EDACS levels IV and V showed that their capacity met the level of their performance, children in EDACS level I had the ability to perform a maximum capacity task, but still had a threefold lower median dysphagia limit than typically developing children. Establishment of the dysphagia limit should be part of general swallowing assessment in children with CP.

PMID: 34418067

17. Effects of Exercise Programs on Anxiety in Individuals with Disabilities: A Systematic Review with a Meta-Analysis
Miguel Jacinto, Roberta Frontini, Rui Matos, Raul Antunes

Review Healthcare (Basel). 2021 Aug 13;9(8):1047. doi: 10.3390/healthcare9081047.

Anxiety symptoms are increasingly prevalent in individuals and may affect their quality of life. Physical exercise (PE) has been shown to be an effective method for reducing anxiety symptoms in the general population. The present study aimed to identify if PE programs can be a good method to reduce anxiety symptoms in individuals with disabilities, through the methodology of a systematic review with a meta-analysis. The PubMed, Web of Science, Scopus, and SPORTDiscus databases were used, considering the period from 2001 to 2021. The descriptors used were: "cerebral palsy", "motor disability", "physical disability", "vision impairment", "visual impairment", "vision disability", "intellectual disability", "mental retardation", "intellectual disabilities", "hearing impairment", "hearing disability", "multiple disabilities", "physical activity", "exercise", "sport", "training", and "anxiety", with the Boolean operator "AND" or "OR". The systematic review with a meta-analysis was carried out in the period between May and June 2021. The Z values (Z-values) obtained to test the null hypothesis, according to which the difference between means is zero, demonstrated a $Z = 2.957$, and a corresponding p-value of 0.003. Thus, we can reject the null hypothesis, and affirm that PE promotes positive effects and can be a good method or methodology for the reduction of anxiety symptoms of individuals with disabilities.

PMID: 34442184

18. Assessment of pain and sleep symptoms in children at high risk for cerebral palsy in a pediatric neurodevelopmental clinic: Implications for future quality improvement interventions
Lisa Letzkus, Katheryn Frazier, Jessica Keim-Malpass

J Pediatr Nurs. 2021 Aug 24;60:293-296. doi: 10.1016/j.pedn.2021.08.017. Online ahead of print.

Children with cerebral palsy (CP) often experience distressing symptoms. It is estimated that 3 in 4 have chronic pain and 1 in 5 have a sleep disorder, with the highest frequency and severity occurring in children with the greatest impairment. Sleep impairment and pain can adversely impact activities, participation and quality of life; however, prevalence of these symptoms in children at risk for CP < 2 years of age remain unknown. The objective of this project was to develop a baseline understanding of the presence of sleep and pain symptoms among children <2 years at high risk for CP to establish a baseline estimate for future quality improvement initiatives. A retrospective chart review was performed on a convenience sample of 50 children <2 years of age that were determined to be high risk for CP. This was determined through a standardized Hammersmith Infant Neurological Evaluation (HINE) global score of less than 56 performed as part of routine care. Descriptive statistics were used to explore the sample. A nonparametric test was used to evaluate the differences between groups. Pain and sleep problems were frequently reported in our sample (38% sleep problems and 32% pain). There were also significant differences between reported symptoms and the HINE. Reported symptoms were associated with lower HINE scores. Sleep and pain are frequent symptoms in children at risk for cerebral palsy. Early identification of these symptoms can lead to clinic-level intervention which may include pharmacological and non-pharmacological management strategies that improve outcomes for children at high risk for CP.

PMID: 34450414

19. Recurrent pain in adolescents with cerebral palsy: a longitudinal population-based study
Selma Mujezinović Larsen, Terje Terjesen, Reidun B Jahnsen, Kjersti Ramstad

Dev Med Child Neurol. 2021 Aug 27. doi: 10.1111/dmcn.15040. Online ahead of print.

Aim: To investigate the pain characteristics, pain interference with activities of daily living, and use of analgesics in adolescents with cerebral palsy (CP) and compare the results with previous findings. Method: Sixty-seven adolescents (median age 14y 4mo, range 12y 2mo-17y, 28 females, 39 males) classified in Gross Motor Function Classification System (GMFCS) levels III to V, who participated in a CP surveillance programme, were assessed on pain measures twice, 5 years apart. Primary caregivers marked recurrent pain sites and graded pain interference with activities of daily living and sleep. Information on pain severity was obtained through two questions from the Child Health Questionnaire (CHQ) and were transformed into a pain score scaled from 0 to 100, where 100 represented no pain. The use of short-acting analgesics was recorded. Results: Over 5 years, the prevalence of recurrent pain, number of pain sites, pain intensity, and pain frequency all increased significantly. The most frequent pain sites were the hip/thigh in GMFCS level V and knee in GMFCS level III. The median CHQ pain score decreased from 60 to 40 ($p<0.001$). Pain interference with activities of daily living increased ($p=0.011$) but not for sleep. Twenty-eight of 54 participants with moderate or severe pain (CHQ pain score ≤60) received no short-acting analgesics. Interpretation: In adolescents with CP, pain increased over 5 years despite follow-up in a surveillance programme. For enhanced management of pain, we propose that an algorithm on pain should be included in surveillance programmes.

PMID: 34448501

20. Active mobility, active participation: a systematic review of modified ride-on car use by children with disabilities
C M Hospodar, H A Feldner, S W Logan

Disabil Rehabil Assist Technol. 2021 Aug 26;1-15. doi: 10.1080/17483107.2021.1963330. Online ahead of print.

Background: Modified ride-on cars (MROC) are a low-cost option to provide self-directed mobility to children with mobility limitations, in lieu of or as a precursor to other powered mobility devices. Objectives: We appraised evidence to (1) describe and categorize MROC study characteristics, (2) synthesize existing knowledge of children's use of MROCs and (3) frame outcomes within the International Classification of Functioning, Disability and Health (ICF) framework. Methods: Articles were identified through four electronic databases: Medline, CINAHL, PsycNET, and Web of Science. We included all published, peer-reviewed studies involving MROC use. Relevant data were extracted, and articles were appraised using the American Academy of Cerebral Palsy and Developmental Medicine criteria for group and single-subject designs. Results: 23 studies met inclusion criteria of 204 titles identified from 1980 to 2021. Study designs included case studies, case series, group designs, and qualitative research, but only three studies were rated evidence level III or higher. Children with a range of disabilities used MROCs across multiple settings, including the home, hospital, and community, though use and adherence varied widely. Positive impacts were reported on a range of outcomes related to the ICF framework, with an emphasis on activity and participation. Conclusions: MROC studies have primarily addressed activity and participation, with most studies suggesting increased functional mobility and social interactions due to MROC use. More robust research designs with larger samples are needed in order to develop evidence-based strategies for MROC use. IMPLICATIONS FOR REHABILITATION: Physical and occupational therapists may consider using MROCs as a therapeutic tool or accessible play opportunity as part of a multi-modal approach to increase children's mobility, family engagement, and participation in community life. Personal (e.g., child's enjoyment) and environmental factors (e.g., caregiver attitudes and stress) must be considered when developing plans of MROC use.

PMID: 34435924

21. Voxel-based map of the inter-arterial watershed zones in children

Christian A Barrera, Anith Chacko, Fabrício Guimarães Gonçalves, Ngoc Jade Thai, Savvas Andronikou

Neuroradiol J. 2021 Aug 23;19714009211041526. doi: 10.1177/19714009211041526. Online ahead of print.

Purpose: To create a voxel-based map of the inter-arterial watershed derived from children who have sustained a hypoxic-ischemic injury involving this region at term. Materials and methods: Patients 0-18 years of age diagnosed with a hypoxic-ischemic injury of the watershed on magnetic resonance imaging (MRI) were included. Two pediatric neuroradiologists segmented the lesions as visualized on the T2-weighted sequence. All lesion maps were normalized to a brain template and overlapped to create a frequency map in order to highlight the frequency of involvement of portions of the cortical watershed. Results: A total of 47 patients (35 boys) were included in the final sample. Their mean age was 7.6 ± 3.6 years. The cortical watershed was successfully mapped. Three watershed regions were defined: the anterior, peri-Sylvian, and posterior watershed zones. The anterior and peri-Sylvian watershed zones are connected through the involvement of the middle frontal gyrus. The peri-Sylvian and the posterior watershed zones are connected through the involvement of the inferior parietal lobule, the posterior aspect of the superior temporal gyrus, and the angular gyrus with the occipital lobe. The temporal lobe and orbital part of the frontal lobe are largely spared in all patients. Conclusion: A voxel-based lesion map of children with watershed hypoxic ischemic injury at term was created and three inter-arterial watershed zones defined: anterior, peri-Sylvian, and posterior watersheds.

PMID: 34423669

22. Nutritional Status of Children with Cerebral Palsy in Gorkha, Nepal: Findings from the Nepal Cerebral Palsy Register

Israt Jahan, Mohammad Muhit, Mahmudul Hassan Al Imam, Ratul Ghose, Amir Banjara Chhetri, Nadia Badawi, Gulam Khandaker

Nutrients. 2021 Jul 25;13(8):2537. doi: 10.3390/nu13082537

Background: The study aimed to define the burden and underlying risk factors of malnutrition among children with cerebral palsy (CP) in Gorkha district, Nepal. Methods: The first population-based register of children with CP in Gorkha, Nepal (i.e., Nepal CP Register-NCPR) was established in 2018. Children aged <18 years with confirmed CP were registered following standard protocol. Nutritional status was determined based on anthropometric measurements (height/length, weight, mid-upper-arm-circumference) following WHO guidelines. Descriptive analyses and adjusted logistic regression were completed. Results: Between June-October 2018, 182 children with CP were registered into the NCPR (mean (SD) age at assessment: 10.3 (5.0) years, 37.4% female). Overall, 51.7%, 64.1%, and 29.3% children were underweight, stunted, and thin, respectively.

Furthermore, 14.3% of children with CP aged <5 years had severe wasting. Underweight and stunting were significantly higher among children with spastic CP ($p = 0.02$, $p < 0.001$) and/or Gross Motor Function Classification System (GMFCS) level (III-V) ($p = 0.01$, $p < 0.001$) and/or who were not enrolled in school ($p = 0.01$, $p < 0.001$). In adjusted analysis, GMFCS level III-V and non-attendance to school significantly increased the odds of stunting by 8.2 (95% CI 1.6, 40.8) and 4.0 (95% CI 1.2, 13.2) times, respectively. Conclusions: the high rate of different forms of undernutrition among children with CP in Gorkha, Nepal is concerning. Need-based intervention should be taken as priority to improve their nutritional outcome.

PMID: 34444697

23. The accuracy of hospital discharge data in recording major congenital anomalies in Australia
Francisco J Schneuer, Samantha J Lain, Jane C Bell, Shona Goldsmith, Sarah McIntyre, Natasha Nassar

Birth Defects Res. 2021 Aug 25. doi: 10.1002/bdr2.1948. Online ahead of print.

Background: There has been increasing use of hospital discharge data to identify congenital anomalies, with limited information about the accuracy of these data. Objectives: To evaluate the accuracy of hospital discharge data in ascertaining major congenital anomalies in infants. Methods: All liveborn infants with major congenital anomalies born between 2004 and 2009 in New South Wales, Australia were included. They were separated into two study groups: (a) infants identified from the Register of Congenital Conditions with a corresponding record in linked hospital discharge data; and (b) infants with a recorded congenital anomaly in hospital data, but without a register record. For the first group, we assessed agreement (concordant diagnoses) and the proportion of anomalies with discrepant diagnoses in each dataset. For the second group, we determined the number of anomalies recorded only in hospital data and applied specific conditions restricting to those recorded in the birth admission, excluding nonspecific diagnoses, or those with relevant surgical procedures to minimize potential false positives or over-reporting. Results: The first study group included 9,346 infants with an average 84% agreement in the ascertainment of major anomalies between hospital and registry data, and >93% agreement for cardiac, abdominal wall, and gastrointestinal anomalies. Discrepant diagnoses occurred on average in 20% of cases from hospital data and 17% from registry data, and were slightly reduced with the use of diagnoses recorded only in tertiary pediatric hospitals. The second group included 25,893 infants where anomalies were only recorded in hospital data, most commonly skin and unspecified anomalies. Excluding unspecified cases, those only diagnosed at the birth admission and restricting to surgical procedures reduced over-reporting by up to 96%. Conclusions: Hospital discharge data provide an acceptable means to ascertain congenital anomalies, but with variable accuracy for different anomalies. Application of specific conditions and limited to surgical procedures improves the utility of using hospital discharge data to ascertain congenital anomalies.

PMID: 34431628

24. Epilepsy in children with cerebral palsy: a data linkage study
Aliya Szpindel, Kenneth A Myers, Pamela Ng, Marc Dorais, Louise Koclas, Nicole Pigeon, Michael Shevell, Maryam Oskoui

Dev Med Child Neurol. 2021 Aug 22. doi: 10.1111/dmcn.15028. Online ahead of print.

Aim: To compare the prevalence of epilepsy in children with cerebral palsy (CP) to peer controls and their differences in healthcare utilization. Method: The Quebec CP registry was linked to the provincial administrative health database. Two CP cohorts were identified from the registry (n=302, 168 males, 1y 2mo-14y) and administrative data (n=370, 221 males, 2y 2mo-14y). A control cohort (n=6040, 3340 males, 10-14y) was matched by age, sex, and region to the CP registry cohort. Administrative data algorithms were used to define epilepsy cases. Data on hospitalizations and emergency department presentations were obtained. Results: Using the most sensitive epilepsy definition, prevalence was 42.05% in the CP registry, 43.24% in the CP administrative data, and 1.39% in controls. Prevalence rose with increasing Gross Motor Function Classification System level. Children with CP and epilepsy had increased number and length of hospitalizations and emergency department presentations compared to children with CP or epilepsy alone. Epilepsy accounted for approximately 5% of emergency department presentations and 10% of hospitalizations in children with epilepsy, with and without CP. Interpretation: Children with CP have an increased risk of epilepsy compared to their peers. Children with CP and coexisting epilepsy represent a unique subset with complex developmental disability and increased healthcare service utilization.

PMID: 34423432

25. The effect of gestational age on major neurodevelopmental disorders in preterm infants
Mads L Larsen, Rikke Wiingreen, Andreas Jensen, Gija Rackauskaite, Bjarne Laursen, Bo M Hansen, Christina E Hoei-Hansen, Gorm Greisen

Pediatr Res. 2021 Aug 21. doi: 10.1038/s41390-021-01710-4. Online ahead of print.

Background: Preterm infants have an increased risk of neurodevelopmental disorders. We established a direct quantitative comparison of the association between the degree of prematurity and three different neurodevelopmental disorders. Methods: In this cohort study, we combined data from 995,498 children in the Danish Medical Birth Register, from birth years 1997-2013, with information on cerebral palsy, epilepsy, and special educational needs. We estimated the gestational week-specific prevalence and risk for each of the disorders. Results: The risk ratio of cerebral palsy at gestational weeks 21-24, compared to term birth, was more than ten times higher than for the two other disorders. The prevalence of epilepsy and special educational needs declined almost parallel, with 9.2% (4.6%-13.5%) and 12.5% (11.2%-13.7%), respectively, per week of gestation toward term birth. Cerebral palsy did not decline similarly: from gestational weeks 21-24 until week 29 the prevalence declined insignificantly by 0.6% (-11.1%-11.0%) per week; whereas from week 29 until term, the prevalence declined markedly by 36.7% (25.9%-45.9%) per week. Conclusions: The prevalence and risk of cerebral palsy are affected differently by the degree of prematurity compared with epilepsy and special educational needs, possibly reflecting important differences in cerebral pathophysiology. Impact: For each week of gestation toward term birth, there was a clear log-linear decline in the prevalence of early childhood epilepsy and special educational needs. In contrast, the risk of cerebral palsy was high at the earliest gestational age, and the prevalence did not decline significantly until gestational week 29, from where it declined notably by nearly 40% for each week of gestation until term birth. Our results indicate important differences in the pathophysiological processes that associate preterm birth with these three neurodevelopmental disorders.

PMID: 34420036

26. Smoflipid Is Better Than Lipofundin for Long-Term Neurodevelopmental Outcomes in Preterm Infants
I-Lun Chen, Chih-Hsing Hung, Hsin-Chun Huang

Nutrients. 2021 Jul 26;13(8):2548. doi: 10.3390/nu13082548.

Neurodevelopmental morbidities developed more commonly in low-birth-weight premature infants. We sought to determine the effects of different lipid emulsions on the neurodevelopmental outcomes of children born prematurely. This retrospective cross-sectional study had two intervention legs, Lipofundin® MCT/LCT (LIPO) versus Smoflipid® (SMOF), which are mainly differentiated by fish oil. Data of premature neonates born between 2001 and 2015 from the research database of Chang Gung Memorial Hospital with corresponding individual medical records up to July 2020 were analyzed. Long-term neurodevelopmental outcomes were defined by the international classification of disease codes -9 or -10. The prevalence of diseases was compared between LIPO and SMOF groups at five and five years old and further analyzed by stratification of 1500 g birth weight. The LIPO and SMOF groups each included 1120 neonates. Epilepsy, cerebral palsy, developmental disorder and attention-deficit hyperactivity disorder (ADHD) were significantly decreased at age two years in the SMOF group, and epilepsy, language delay (LD), ADHD and autism spectrum disorder (ASD) were significantly decreased in the SMOF group at age five years. In children with birth weight < 1500 g, ADHD was decreased in the SMOF group at ages two and five years, and ASD was decreased in the SMOF group at age five years. In children with birth weight ≥ 1500 g, epilepsy, LD and ADHD were decreased in the SMOF group at age two years. LD was decreased in the SMOF group at age five years. We conclude that lipid emulsions with fish oil improve the neurodevelopmental outcomes of children born prematurely.

PMID: 34444708

27. Age of Diagnosis, Fidelity and Acceptability of an Early Diagnosis Clinic for Cerebral Palsy: A Single Site Implementation Study
Anna Te Velde, Esther Tantsis, Iona Novak, Nadia Badawi, Jane Berry, Prue Golland, Johanna Korkalainen, Robyn McMurdo, Ronda Shehata, Catherine Morgan

Brain Sci. 2021 Aug 16;11(8):1074. doi: 10.3390/brainsci11081074.

Cerebral palsy (CP) diagnosis is historically late, at between 12 and 24 months. We aimed to determine diagnosis age, fidelity to recommended tests and acceptability to parents and referrers of an early diagnosis clinic to implement a recent evidence-based clinical guideline for the early diagnosis of CP. A prospective observational case series of infants <12 months with detectable risks for CP attending our clinic was completed with data analysed cross-sectionally. Infants had a high risk of CP diagnosis at a mean age of 4.4 (standard deviation [SD] 2.3) months and CP diagnosis at 8.5 [4.1] months. Of the 109 infants seen, 57% had a diagnosis of CP or high risk of CP, showing high specificity to our inclusion criteria. Parent and referrer acceptability of the clinic was high. Paediatricians had the highest rate of referral (39%) followed by allied health (31%), primary carer (14%) and other health workers (16%). Fidelity to the guideline was also high. All infants referred <5 mths had the General Movements Assessment (GMA) and all except one had the Hammersmith Infant Neurological Examination (HINE) administered. N = 92 (84%) of infants seen had neuroimaging, including n = 53 (49%) who had magnetic resonance imaging (MRI), showing recommended tests are feasible. Referral to CP-specific interventions was at 4.7 [3.0] months, sometimes before referral to clinic. Clinicians can be confident CP can be diagnosed well under 12 months using recommended tools. This clinic model is acceptable to parents and referrers and supports access to CP-specific early interventions when they are likely to be most effective.

PMID: 34439692

28. Big data to analyze patterns of care and improve outcomes for children with cerebral palsy
Felix Scholtes, Philippe Kolh

Dev Med Child Neurol. 2021 Aug 21. doi: 10.1111/dmcn.15027. Online ahead of print.

PMID: 34418075

29. Scope and Practices of Physical Therapists Working With Children: Results From an International Online Survey
Chantal Camden, Hilda Mulligan, Boya Nugraha, Jade Berbari, Cheyenne Gauvin, Eda Cinar, Christoph Gutenbrunner

Pediatr Phys Ther. 2021 Aug 19. doi: 10.1097/PEP.0000000000000816. Online ahead of print.

Purpose: To describe the scope of practice of physical therapists (PTs) working with children worldwide. Methods: PTs working with children in any context and country were invited via social media and email campaigns to complete an online survey containing 42 questions about work context and service delivery. Descriptive statistics were computed. Results: Of the 1133 participants from 77 countries, most worked with children full-time (51.8%), and in government-funded work settings (57.5%). Modalities of access to services varied across countries, work settings, and children's conditions, yet 46.7% of PTs reported that most children had direct access to services. PTs provided services to children with a variety of conditions, with cerebral palsy being most reported (83.3%). Interventions focused primarily on improving body function (42.0%) and on providing face-to-face individual treatment (96.6%). Conclusions: This study provides an international portrait of pediatric PT practice and illustrates the diversity of services in pediatric PT.

PMID: 34417425

30. Multi-Organ Dysfunction in Cerebral Palsy
John Allen, Zunera Zareen, Samantha Doyle, Laura Whitla, Zainab Afzal, Maria Stack, Orla Franklin, Andrew Green, Adam James, Timothy Ronan Leahy, Shoana Quinn, Basil Elnazir, John Russell, Sri Paran, Patrick Kiely, Edna Frances Roche, Ciara McDonnell, Louise Baker, Owen Hensey, Louise Gibson, Stephanie Kelly, Denise McDonald, Eleanor J Molloy

Review Front Pediatr. 2021 Aug 9;9:668544. doi: 10.3389/fped.2021.668544. eCollection 2021.

Cerebral Palsy (CP) describes a heterogenous group of non-progressive disorders of posture or movement, causing activity limitation, due to a lesion in the developing brain. CP is an umbrella term for a heterogenous condition and is, therefore, descriptive rather than a diagnosis. Each case requires detailed consideration of etiology. Our understanding of the underlying cause of CP has developed significantly, with areas such as inflammation, epigenetics and genetic susceptibility to subsequent

insults providing new insights. Alongside this, there has been increasing recognition of the multi-organ dysfunction (MOD) associated with CP, in particular in children with higher levels of motor impairment. Therefore, CP should not be seen as an unchanging disorder caused by a solitary insult but rather, as a condition which evolves over time. Assessment of multi-organ function may help to prevent complications in later childhood or adulthood. It may also contribute to an improved understanding of the etiology and thus may have an implication in prevention, interventional methods and therapies. MOD in CP has not yet been quantified and a scoring system may prove useful in allowing advanced clinical planning and follow-up of children with CP. Additionally, several biomarkers hold promise in assisting with long-term monitoring. Clinicians should be aware of the multi-system complications that are associated with CP and which may present significant diagnostic challenges given that many children with CP communicate non-verbally. A step-wise, logical, multi-system approach is required to ensure that the best care is provided to these children. This review summarizes multi-organ dysfunction in children with CP whilst highlighting emerging research and gaps in our knowledge. We identify some potential organ-specific biomarkers which may prove useful in developing guidelines for follow-up and management of these children throughout their lifespan.

PMID: 34434904

31. Resistance to Neuromuscular Blockade by Rocuronium in Surgical Patients with Spastic Cerebral Palsy
Stephanie Lee, Karyn Robinson, Madison Lodge, Mary Theroux, Freeman Miller, Robert Akins Jr

J Pers Med. 2021 Aug 3;11(8):765. doi: 10.3390/jpm11080765.

Individuals with spastic cerebral palsy (CP) often exhibit altered sensitivities to neuromuscular blocking agents (NMBAs) used for surgical intubation. We assessed usage of the NMBA rocuronium in patients with spastic CP and evaluated potential modifiers of dosing including gross motor function classification system (GMFCS) level, birthweight, gestational age, and the use of anticonvulsant therapy. In a case-control study, surgical patients with spastic CP (n = 64) or with idiopathic or non-neuromuscular conditions (n = 73) were enrolled after informed consent/assent. Patient data, GMFCS level, anticonvulsant use, and rocuronium dosing for intubation and post-intubation neuromuscular blockade were obtained from medical records. Findings reveal participants with CP required more rocuronium per body weight for intubation than controls (1.00 ± 0.08 versus 0.64 ± 0.03 mg/kg; $p < 0.0001$). Dosing increased with GMFCS level (Spearman's rho = 0.323; $p = 0.005$), and participants with moderate to severe disability (GMFCS III-V) had elevated rocuronium with (1.21 ± 0.13 mg/kg) or without (0.86 ± 0.09 mg/kg) concurrent anticonvulsant therapy. Children born full-term or with birthweight >2.5 kg in the CP cohort required more rocuronium than preterm and low birthweight counterparts. Individuals with CP exhibited highly varied and significant resistance to neuromuscular blockade with rocuronium that was related to GMFCS and gestational age and weight at birth.

PMID: 34442409

32. Abdominal Spasm Induced Urinary Incontinence in a Patient With Cerebral Palsy: The Diagnostic Utility of Urodynamics in Neurological Disorder Management
Ranveer Vasdev, Elizabeth Schlessinger, Nissrine Nakib

Case Reports Cureus. 2021 Jul 20;13(7):e16524. doi: 10.7759/cureus.16524. eCollection 2021 Jul.

The presentation of incontinence in a patient with complex neurological disorders can vary substantially and depend on the location and nature of neurological injuries. In this case report, a 53-year-old female with cerebral palsy presents with recurrent episodes of catheter discharge and incontinence due to presumed bladder spasms. However, urodynamics (UDS) study reveals the spasms to be abdominal in origin. This unique case illustrates the diagnostic utility of UDS and important considerations when evaluating patients with complex medical and neurological disorders.

PMID: 34430134

33. Prevalence and incidence of physical health conditions in people with intellectual disability - a systematic review
Peiwen Liao, Claire Vajdic, Julian Trollor, Simone Reppermund

PLoS One. 2021 Aug 24;16(8):e0256294. doi: 10.1371/journal.pone.0256294. eCollection 2021.

Objective: To synthesize evidence on the prevalence and incidence of physical health conditions in people with intellectual disability (ID). Methods: We searched Medline, PsycInfo, and Embase for eligible studies and extracted the prevalence, incidence, and risk of physical health conditions in people with ID. Results: Of 131 eligible studies, we synthesized results from 77 moderate- to high-quality studies, which was mainly limited to high-income countries. The highest prevalence estimates were observed for epilepsy, ear and eye disorders, cerebral palsy, obesity, osteoporosis, congenital heart defects, and thyroid disorders. Some conditions were more common in people with a genetic syndrome. Compared with the general population, many health conditions occur more frequently among people with ID, including asthma and diabetes, while some conditions such as non-congenital circulatory diseases and solid cancers occur at the same or lower rate. The latter associations may reflect under-detection. Conclusions: People with ID have a health profile more complex than previously known. There is a pressing need for targeted, evidence-informed population health initiatives including preventative programs for this population.

PMID: 34428249