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## Interventions and Management

### 1. Validity and reliability of an iPad with a three-dimensional camera for posture imaging.

Agustsson A, Gislason MK, Ingvarsson P, Rodby-Bousquet E, Sveinsson T.

Gait Posture. 2018 Dec 15;68:357-362. doi: 10.1016/j.gaitpost.2018.12.018. [Epub ahead of print]

**BACKGROUND:** It is important to quantify a static posture to evaluate the need for and effectiveness of interventions such as physical management, physiotherapy, spinal orthosis or surgical treatment on the alignment of body segments. Motion analysis systems can be used for this purpose, but they are expensive, require a high degree of technical experience and are not easily accessible. A simpler method is needed to quantify static posture. **RESEARCH OBJECTIVE:** Assess validity and inter and intra rater reliability using an iPad with a 3-D camera to evaluate posture and postural deformity. **METHOD:** A 3-D model of a lying posture, created using an iPad with a 3-D camera, was compared to a Qualisys motion analysis system of the same lying posture, the latter used as the gold standard. Markers on the trunk and the leg were captured by both systems, and results from distance and angle measurements were compared. **RESULTS:** All intra-class correlation coefficient values were above 0.98, the highest systematic error was 4.3 mm for length measurements and 0.2° for angle measurements. **SIGNIFICANCE:** A 3-D model of a person, with markers on anatomical landmarks, created with an iPad with a 3-D camera, is a valid and reliable method of quantifying static posture. **CONCLUSION:** An iPad with a 3-D camera is a relatively inexpensive, valid and reliable method to quantify static posture in a clinical environment.

PMID: [30580201](#)

### 2. Evidence Supporting Selective Dorsal Rhizotomy for Treatment of Spastic Cerebral Palsy.

Park TS, Dobbs MB, Cho J.

Cureus. 2018 Oct 19;10(10):e3466. doi: 10.7759/cureus.3466.

The objective of this review is to analyze the evidence supporting selective dorsal rhizotomy (SDR) for the treatment of spastic cerebral palsy (CP). We reviewed 85 outcome studies from 12 countries between 1990 and 2017. The published results are overwhelmingly supportive of SDR, and 39 studies form a basis for this review. Also included is some of the clinical experience of the senior author. The results show that SDR plus postoperative physiotherapy (PT) improved gait, functional independence, and self-care in children with spastic diplegia. In adults with a follow-up of 20 to 28 years, the early improvements after childhood SDR were sustained and improved quality of life. Furthermore, majority of the adults who underwent SDR as children would recommend SDR to others. On the clinical side, while SDRs through multilevel laminectomies or laminoplasty were associated with spinal deformities (i.e., scoliosis, hyperlordosis, kyphosis, spondylolisthesis, spondylolysis, and nonhealing of laminoplasty), SDRs through a single level laminectomy prevented SDR-related spinal problems. The outcomes of SDR specific to spastic quadriplegia require further investigation because of the relatively small patient population with quadriplegia. Lastly, we found that SDR can prevent or reverse premature aging in

adolescents and adults with spastic diplegia. In conclusion, the evidence supporting the efficacy of SDR is strong, and SDR is a well-established option for spasticity management in spastic CP.

PMID: [30585282](#)

### **3. Do All Patients With Cerebral Palsy Require Postoperative Intensive Care Admission After Spinal Fusion?**

Brooks JT, Yaszay B, Bartley CE, Bastrom TP, Sponseller PD, Shah SA, Samdani A, Cahill PJ, Miyanji F, Newton PO; Harms Study Group.

Spine Deform. 2019 Jan;7(1):112-117. doi: 10.1016/j.jspd.2018.06.003.

**STUDY DESIGN:** Retrospective review of a prospective cohort. **OBJECTIVE:** To identify patient and surgical factors that alter the length of postoperative intensive care unit (ICU) stays after spinal fusion/instrumentation in patients with neuromuscular scoliosis secondary to cerebral palsy (CP). **SUMMARY OF BACKGROUND DATA:** High perioperative complication rates in patients with CP contribute to the practice of utilizing the ICU postoperatively for monitoring. However, this is costly and little is known regarding which patients truly need this increased acuity of care. **METHODS:** A prospective, multicenter database was queried for patients with CP who underwent spinal fusion and instrumentation. Patients with an ICU length of stay (LOS)  $\leq 1$  day were assumed to not have required postoperative ICU admission. Demographic and surgical characteristics were compared between those with ICU LOS of  $\leq 1$  day versus  $>1$  day. A classification and regression tree (CART) analysis was utilized to create a decision algorithm for postoperative ICU admission. **RESULTS:** Three hundred twenty-four patients were identified with a mean ICU LOS of 4.7 days (range 0-47). Sixty-eight patients (21%) had an ICU LOS  $\leq 1$  day and 256 patients (79%) had an ICU LOS  $>1$  day. CART analysis demonstrated that the institution where the surgery was performed was the primary predictor with two groups: sites that almost routinely had ICU stay  $>1$  day (92%) and those that were split (50.5%  $>1$  day). In the latter group, an operative time greater than 4 hours was a risk factor for a longer ICU stay. **CONCLUSION:** Because of their heterogeneous makeup, CP patients should be evaluated individually and their postoperative disposition should not be based on institutional tradition but instead on objective surgical factors. For those patients with surgical times less than 4 hours, discussions should be held regarding the safety of a postoperative disposition to a regular floor. **LEVEL OF EVIDENCE:** Level III.

PMID: [30587303](#)

### **4. Preoperative Variables Associated With Respiratory Complications After Pediatric Neuromuscular Spine Deformity Surgery.**

Luhmann SJ, Furdock R.

Spine Deform. 2019 Jan;7(1):107-111. doi: 10.1016/j.jspd.2018.05.005.

**OBJECTIVE:** The objective of this study is to identify preoperative laboratory values and patient factors that are associated with postoperative respiratory complications in pediatric neuromuscular scoliosis (NMS) populations undergoing posterior spinal fusion (PSF) with instrumentation. **SUMMARY OF BACKGROUND DATA:** PSF in NMS patients are high-risk surgeries. Respiratory complications are the most common postoperative event, with rates up to 28.2% following surgery. **METHODS:** A single-surgeon, two-hospital pediatric spine surgery database was reviewed to identify all patients who underwent PSF for NMS. Diagnoses included cerebral palsy (n=83), myelomeningocele (n=13), spinal muscular atrophy (n=4), and other (n=11). This study defined respiratory complications as postoperative pneumonia, pleural effusion, pneumothorax, need for reintubation, respiratory status requiring a return to the pediatric intensive care unit (PICU), or prolonged ( $>4$ -day) need for mechanical ventilation. Preoperative laboratory values for transferrin, prealbumin, hemoglobin/hematocrit, total protein, albumin, and total lymphocyte count were collected. **RESULTS:** There were 50 males and 61 females with a mean age of 14 years 2.5 months (8-20 years). Seventeen patients (15.3%) experienced postoperative respiratory complications. On univariate analysis, any history of pneumonia, the presence of gastrostomy tube, and low transferrin levels were associated with postoperative respiratory complications, and a strong trend ( $p=.06$ ) was observed for tracheostomy. On multivariate analysis, the presence of gastrostomy tube and history of pneumonia remained as clinically significant predictors of postoperative respiratory complications. **CONCLUSION:** Pediatric NMS patients undergoing PSF that have history of pneumonia or gastrostomy tube present at time of surgery are at increased risk for postoperative respiratory complications. The univariate associations of tracheostomy presence and low transferrin levels with postoperative respiratory complications deserve further examination. **LEVEL OF EVIDENCE:** Level II.

PMID: [30587301](#)

### 5. Reliability of Radiographic Assessments of the Hip in Cerebral Palsy.

Shore BJ, Martinkevich P, Riazi M, Baird E, Encisa C, Willoughby K, Narayanan UG.

J Pediatr Orthop. 2018 Dec 26. doi: 10.1097/BPO.0000000000001318. [Epub ahead of print]

**INTRODUCTION:** Children with cerebral palsy are at risk for progressive hip displacement. Since surveillance for hip displacement uses specific radiographic measurements to guide decision making, it is important to establish the reliability of these measurements, which include Reimer's migration percentage (MP), acetabular index or acetabular angle (AI or AA), and pelvic obliquity (PO). The purpose of this study was to determine the intraobserver and interobserver reliability of these radiographic measures among an international group of pediatric orthopaedic surgeons participating in the prospective international multicenter Cerebral Palsy Hip Outcomes Project (CHOP) currently underway to evaluate the outcomes of hip interventions in cerebral palsy. **METHODS:** Two compact discs (CDs) containing the same 25 anteroposterior pelvis radiographs in Digital Imaging and Communications in Medicine (DICOM) format were provided to participating surgeons at least 2 weeks apart. To reduce the likelihood of recall or any effects of learning or fatigue, the order of the radiographs varied on the 2 CD versions, and participating surgeons received the 2 CDs in random order. The intraclass correlation coefficients (ICCs) were calculated to assess interobserver and intraobserver reliability. Mean absolute differences of hip measurements obtained at 2 time points were also calculated. **RESULTS:** The MP had the highest reliability followed by PO, AI, and AA with a mean intrarater ICC (SD; range) of 0.95 (0.04; 0.84 to 0.98); 0.92 (0.03; 0.85 to 0.97); 0.84 (0.05; 0.75 to 0.92); and 0.82 (0.14; 0.51 to 0.98); respectively. The mean interrater ICC (SD; range) for MP, PO, AI, and AA were 0.94 (0.05; 0.78 to 0.99); 0.90 (0.04; 0.76 to 0.99); 0.79 (0.08; 0.52 to 0.93); and 0.69 (0.23; 0.42 to 0.98) for MP, PO, AI, and AA, respectively. The mean (SD; 95% confidence interval) for the absolute difference between the 2 measurements for the raters was 4.9% (2.9%; 3.4%-6.4%); 3.8 degrees (1.2 degrees; 3.1-4.5 degrees); 2.6 degrees (1.5 degrees; 1.7-3.5 degrees); and 1.3 degrees (0.3 degrees; 1.29-1.31 degrees) for MP, AI, AA, and PO, respectively. **CONCLUSIONS:** MP is a reproducible measure with excellent intrarater and interrater reliability. However, differences in MP of <7% should be treated with caution as these might be a consequence of measurement error. Although we found a high level of intrarater and interrater reliability of the AI, AA, and PO, these measurements are more variable and not ideal for use as discrete outcome measures. Instead, these parameters might be useful for prognostication and decision making when consistent trends are observed longitudinally over time which might be better indications of true change.

PMID: [30589680](#)

### 6. Reliability of maximum isometric hip and knee torque measurements in children with cerebral palsy using a paediatric exoskeleton - Lokomat.

Cherni Y, Girardin-Vignola G, Ballaz L, Begon M.

Neurophysiol Clin. 2018 Dec 23. pii: S0987-7053(18)30222-3. doi: 10.1016/j.neucli.2018.12.001. [Epub ahead of print]

**BACKGROUND:** The Lokomat (by L-Force tool) allows the measurement of the maximum voluntary isometric torque (MVIT) at the knee and hip joints in a standing position, as close as possible to the posture adopted during walking. However, the reliability of this measurement in children with cerebral palsy (CP) remains unknown. The main goal of this study was to evaluate inter and intra-tester reliability of a novel tool (L-Force) in CP population. **PROCEDURE:** L-Force reliability was determined in 17 children with CP by two experienced therapists. We collected MVITs in hip and knee flexors and extensors. Relative and absolute reliability of maximum joint torques were estimated using the intra-class correlation coefficient (ICC) and standard error of measurement (SEM), respectively. The correlation between L-Force and hand-held dynamometer (HHD) was also reported. **FINDINGS:** ICCs were good to excellent for intra and inter-tester reliability (all  $P \leq 0.001$ ). The SEM ranged from 2.0 to 4.1 Nm (12.1 to 21.7%) within-tester and from 2.1 to 3.5 Nm (11.9 to 22.5%) between testers. The correlation was fair to good between L-Force and HHD measures ( $r = [0.50-0.75]$ ; all  $P < 0.01$ ) with higher values for flexors than extensors. **CONCLUSION:** The L-Force is a reliable tool for quantifying the hip and knee flexors and extensors torques in children with cerebral palsy with an important timesaving and in a more functional posture than traditional HHD.

PMID: [30587422](#)

### 7. Tibialis posterior transfer for foot drop due to central causes: Long-term hindfoot alignment.

Sturbois-Nachef N, Allart E, Grauwin MY, Rousseaux M, Thévenon A, Fontaine C.

Orthop Traumatol Surg Res. 2018 Dec 24. pii: S1877-0568(18)30370-0. doi: 10.1016/j.otsr.2018.11.013. [Epub ahead of print]

**BACKGROUND:** Tibialis posterior transfer (TPT) is the treatment most widely used to palliate foot drop due to dorsiflexor palsy. TPT has been extensively studied in patients with peripheral neurological causes of foot drop. In contrast, data are scarce on central foot drop, in which TPT is often blamed for causing flattening of the arches. The primary objective of this study was to assess the impact on foot alignment of TPT in patients with central foot drop. The secondary objective was to determine whether TPT combined with other surgical procedures improved gait. **HYPOTHESIS:** TTP can induce flattening of the medial arch of the foot. **PATIENTS AND METHODS:** We retrospectively identified 13 patients managed with TPT (1 foot per patient). Mean follow-up was 65 months (range, 12-108 months). The causes were stroke (n=5), head injury (n=3), spinal cord injury (n=2), cervical spondylotic myelopathy (n=1), cerebral palsy (n=1), and a brain tumour (n=1). The clinical assessment focused chiefly on forefoot alignment and footprint parameters. The following variables were collected from weight-bearing radiographs: Djian-Annonier angle, Méary-Toméno angle, lateral arch angle, and calcaneal pitch angle in the sagittal plane; talo-metatarsal angle in the transverse plane; and rearfoot valgus angle in the coronal plane. **RESULTS:** Of the 13 feet, 6 had normal footprint parameters and 7 pes cavus. There were no cases of flatfoot. Pronation deformities and supination deformities were each found in 2 patients. Comparing the radiographic parameters between the two feet in each patient identified differences only for the lateral arch angle and calcaneal pitch angle, which indicated pes cavus on the operated side (operated side: 142.7° [range, 136°-156°], p=0.041; and 24° [range, 14°-33°], p=0.028, respectively). **DISCUSSION:** In contrast to the working hypothesis, we found no evidence of progression to valgus flatfoot after TPT transfer performed to treat central foot drop. **LEVEL OF EVIDENCE:** IV, retrospective study with no control group.

PMID: [30591416](#)

### **8. Pre- and Postoperative Gait Analysis and Video for Selective Dorsal Rhizotomy in Spastic Diplegia: 2-Dimensional Operative Video.**

Archer J, Yaacoub AP, Angulo-Parker F, Fritsch G, Riner S, Coon A, Johnson SK, Delima S, Jea A, Raskin JS.

Oper Neurosurg (Hagerstown). 2018 Dec 27. doi: 10.1093/ons/opy392. [Epub ahead of print]

Severe lower limb spasticity can hinder motor tasks and negatively impacts the quality of life in patients with cerebral palsy. Selective dorsal rhizotomy is a well-established neurosurgical intervention aimed at reducing muscle spasticity in patients with such neuromuscular conditions. Long-term outcomes of selective dorsal rhizotomy have been promising among the authors' institutional series of patients. In this case, we demonstrate the use of L1-S1 osteoplastic laminoplasty and L1-S1 selective dorsal rhizotomy in a 5-year-old male patient with cerebral palsy and spastic lower extremity diplegia. Favorable selection criteria for this case included disabling lower extremity diplegia, young age, good core strength, no cognitive delay, and strong rehabilitation potential. The patient's preoperative functional status was noncommunity ambulator (Gross Motor Function Classification System Level III) with walker use and good dynamic balance. Prior to the procedure, he demonstrated an overall decreased muscle strength in bilateral lower extremities with bilateral hamstring spasticity (Ashworth 3) and bilateral heel cord spasticity (Ashworth 4). Rhizotomy was performed with identification and selective sectioning of dorsal nerve roots with abnormal stimulation patterns. Fibers with unsustained discharge of appropriate muscles were identified and spared. No intraoperative or postoperative complications were encountered. The patient had minimal back pain and surgical morbidity postoperatively. Following the procedure and highly structured inpatient and outpatient rehabilitation therapies, the patient exhibited significant improvement in gait velocity (84%) and gait cadence (66%) at 5 months. Additionally, the patient demonstrated greater independence of activities of daily living and improvements in mobility by Pediatric Evaluation Disability Index. Patient consent was obtained from the parent.

PMID: [30590806](#)

### **9. A mathematical model for decision-making in the classification of para-footballers with different severity of coordination impairments.**

Pastor D, Campayo-Piernas M, Pastor JT, Reina R.

J Sports Sci. 2018 Dec 24;1-8. doi: 10.1080/02640414.2018.1560617. [Epub ahead of print]

Classification is a defining feature of Para-sport, and sports-specific classification systems determined through multidisciplinary scientific research are required, i.e., evidence-based and focused on the relationship between the impairment and the key performance determinants. Data envelopment analysis (DEA) was applied as a classification tool using a directional distance function (DDF) model. The aim of the study was to test the DEA as a possible classification tool in cerebral palsy football. We analyse the performance of 56 international para-footballers with hypertonia, ataxia or athetosis, who completed a 20-test battery with DEA models. Five of the tests are included in the model (change of direction: Illinois agility test; jumping: standing broad jump, four bounds for distance, and triple hop with the non-dominant leg; 10-m sprint/acceleration; and ball dribbling, both in a straight line and following a trajectory), showing that players with less impairment

exhibit the highest efficiency. This outcome suggests that DEA models might be feasible for detecting and discriminating the performance and magnitude of impairment in cerebral palsy football, with an objective ranking of the athletes in relation to different physical performance tests. This study also provides reference scores for decision-making during classification and guidance for further research in team Paralympic sports.

PMID: [30583709](#)

#### **10. The severity of chewing disorders is related to gross motor function and trunk control in children with cerebral palsy.**

Serel Arslan S, Demir N, İnal Ö, Karaduman AA.

Somatosens Mot Res. 2018 Dec 28;1-5. doi: 10.1080/08990220.2018.1521788. [Epub ahead of print]

**PURPOSE:** The frequency of chewing disorders increases with decreasing level of gross motor function in children with cerebral palsy (CP). Besides its frequency, the severity of chewing disorders is also important. The aim of this study was to determine the relationship between chewing performance level and gross motor function, and trunk postural control in children with CP. **MATERIALS AND METHODS:** The study included 119 children with CP (age 2-10 years). Chewing performance level was determined by the Karaduman Chewing Performance Scale (KCPS). The Gross Motor Function Classification System (GMFCS) was used to determine the level of gross motor function. Segmental Assessment of Trunk Control (SATCo) was used to measure trunk control. **RESULTS:** Children with spastic CP with a median age of 4 years were evaluated, of which 50.4% were male. The percentages of patients classified to GMFCS levels I to V were 43.7%, 6.7%, 9.2%, 5.0%, and 35.3%, respectively. The median KCPS score was 3 (min = 0, max = 4). A good correlation was found between KCPS and GMFCS ( $p < .001$ ,  $r = 0.70$ ). Negative, excellent correlations between KCPS and SATCo static, SATCo active, and SATCo reactive postural controls were found ( $p < .001$ ,  $r = -0.75$ ,  $r = -0.77$ ,  $r = -0.79$ ; respectively). **CONCLUSIONS:** The severity of chewing disorders is related to the level of gross motor function and trunk postural control in children with CP. Clinical trial number: NCT03241160.

PMID: [30592431](#)

#### **11. Evaluation of periodontal status and detection of Dialister pneumosintes in cerebral palsy individuals: A Case-Control study.**

Mohammed SR, Anand N, Chandrasekaran SC, Mahalakshmi K, Padmavathy K.

Indian J Dent Res. 2018 Nov-Dec;29(6):768-772. doi: 10.4103/ijdr.IJDR\_582\_15.

**BACKGROUND:** The worldwide prevalence of cerebral palsy among live births is estimated to be between 1.9 and 3.6/1000. The presence of periodontal disease in cerebral palsy children typically is due to bacterial plaque accumulation caused by their inability to correctly clean their own teeth, difficulties in chewing and swallowing food, and improper movements of masticatory muscles and tongue muscles. **OBJECTIVES:** The objective of this study is to estimate the periodontal status in cerebral palsy individuals and evaluate the presence of Dialister pneumosintes. **MATERIALS AND METHODS:** Thirty cerebral palsy children from the Spastics Society of Tamilnadu with signs of periodontitis were compared with the same number of age- and gender-matched controls for oral hygiene and periodontal parameters. Subgingival plaque samples were screened for the presence of respiratory pathogen D. pneumosintes by polymerase chain reaction (PCR). **RESULTS:** A variation was noted between types of cerebral palsy individuals with a mean probing pocket depth value of 6 in spastic type, 4.86 in the ataxic, and 4.3 in the dyskinetic. Clinical attachment level varied from 6.71 in spastic to 5.43 in ataxic and 3.50 in dyskinetic. Oral hygiene index-simplified ranged from 2.764 in spastic to 2.25 in ataxic and 1.41 in dyskinetic. PCR results indicated 25% and 21.7% positivity for D. pneumosintes among cerebral palsy and control group, respectively. The odds ratio calculated to estimate the risk of periodontitis due to D. pneumosintes was 0.765. **CONCLUSION:** It was concluded that oral hygiene status and severity of periodontitis worsens as the rigidity and muscle tone limiting limb movement increases in cerebral palsy individuals.

PMID: [30589006](#)

#### **12. [Assessment of neurodevelopment in children of different gestational age with neonatal seizures].**

Zavadenko AN, Medvedev MI, Degtyareva MG.

Zh Nevrol Psikhiatr Im S S Korsakova. 2018;118(11):35-42. doi: 10.17116/jnevro201811811135. [Article in Russian; Abstract available in Russian from the publisher]

AIM: To assess psychomotor development in infants with neonatal seizures (NS) born with different gestational age, by means of Bayley-III scales of infant and toddler development, in their corrected age of 1 year. MATERIAL AND METHODS: The study included 52 infants, who had NS and were born with different gestational age: 28 weeks or less (n=26) - group I, 29-32 weeks (n=16) - group II, 33-36 weeks (n=3) - group III, 37-41 weeks (n=7) - group IV. The infants' neurodevelopment was evaluated in their corrected age of 1 year by means of N. Bayley scales of infant and toddler development, third edition: Cognitive, Language, Motor, Social-Emotional, and Adaptive Behavior. RESULTS AND CONCLUSION: Only 17 (32,7%) of 52 examined infants did not demonstrate any developmental delay on each of five Bayley-III scales. Significant developmental delay (composite score <70) on at least one scale was revealed in 23 (44,2%) patients, including 12 (46,2%) in group I, 5 (31,3%) in group II, 6 (60%) of 10 in the combined group III-IV. In most cases, neurodevelopmental delays were attributed to only one domain and could be indicated as partial. The conclusion about global developmental retardation (the composite scores 55 or less on all five scales) was done in 3 patients, each of whom had a co-morbidity of cerebral palsy and epilepsy.

PMID: [30585602](#)

### 13. Risk of Depression and Anxiety in Adults With Cerebral Palsy.

Smith KJ, Peterson MD, O'Connell NE, Victor C, Liverani S, Anokye N, Ryan JM.

JAMA Neurol. 2018 Dec 28. doi: 10.1001/jamaneurol.2018.4147. [Epub ahead of print]

IMPORTANCE: Cerebral palsy (CP) is considered a pediatric condition despite most individuals with CP living into adulthood. Thus, there is a lack of evidence in adults with CP, which includes a paucity of research examining mental health in this population. OBJECTIVES: To determine the risk of depression and anxiety in adults with CP compared with an age-, sex-, and practice-matched reference group of adults without CP, using primary care data. DESIGN, SETTING, AND PARTICIPANTS: Retrospective longitudinal cohort study set in UK primary care. Data were analyzed using Cox proportional hazards regression analyses adjusted for chronic conditions and visits to their physician. The study period ran from January 1987 to November 2015. Data of entry into the study ranged from January 1987 to September 2015. Data for 1705 adults 18 years or older with CP and 5115 matched adults without CP were extracted. Cerebral palsy was identified using diagnostic codes, and each person with CP was compared with 3 age-, sex-, and practice-matched controls. EXPOSURES: Diagnosis of CP, with a second analysis accounting for comorbidity of intellectual disability (ID). MAIN OUTCOMES AND MEASURES: Time to diagnosis for depression or anxiety following the date of entry into the study in adults with CP (with and without ID) compared with matched controls. RESULTS: The mean (SD) age of the 1705 patients with CP and the 5115 adults without CP was 33.3 (15.5) years, and 798 participants (46.8%) were women. Individuals with CP had an increased adjusted hazard of depression (hazard ratio [HR], 1.28; 95% CI, 1.09-1.51) and anxiety (HR, 1.40; 95% CI, 1.21-1.63) compared with the matched reference group. When we accounted for ID comorbidity, there were 363 adults with CP who also had ID (mean [SD] age, 32.1 [13.2] years; 159 women [47.6%]) and 1342 adults with CP who did not have ID (mean [SD] age, 33.6 [16.1] years; 639 women [43.8%]). Only those individuals with CP and no comorbid ID had a higher risk of incident depression (HR, 1.44; 95% CI, 1.20-1.72) and anxiety (HR, 1.55; 95% CI, 1.28-1.87) than their matched controls. CONCLUSIONS AND RELEVANCE: Adults with CP have an increased risk of depression or anxiety. In particular, these results indicate that this association is driven largely by those individuals with CP with no co-occurring ID. Future work is needed in community-based samples to fully elucidate the causal mechanisms driving these associations.

PMID: [30592485](#)

### 14. Factors associated with depression and anxiety in children with intellectual disabilities.

Whitney DG, Shapiro DN, Peterson MD, Warschausky SA.

J Intellect Disabil Res. 2018 Dec 26. doi: 10.1111/jir.12583. [Epub ahead of print]

BACKGROUND: Individuals with intellectual disabilities (ID) are at increased risk for depression and anxiety disorders; however, there is a paucity of research that pertains to associative factors for these mental health disorders in this population. The objective of this investigation was to determine factors associated with depression and anxiety problems in children with ID. METHODS: Children 6-17 years with ID (n = 423; 63% male) from the 2016 National Survey of Children's Health were included in this cross-sectional study. Outcome measures included depression and anxiety problems. Predictor variables included sociodemographics, ID severity, co-morbid conditions (autism spectrum disorders, epilepsy, cerebral palsy, Down syndrome and attention-deficit/hyperactivity disorder), physical factors (i.e. physical activity, sleep duration and pain) and social factors (e.g. participation in activities and bully victimisation). Multivariable logistic regression was performed to determine the association between all factors and depression and/or anxiety problems among children with ID. RESULTS: The prevalence of depression and/or anxiety problems was 35.4%. After adjusting for sociodemographics, Hispanic race was associated with lower odds [odds ratio (OR), 0.3; 95% confidence interval (CI), 0.1-0.8] of depression and/or anxiety problems.

After adjusting for race, co-morbid conditions, and physical and social factors, autism spectrum disorders (OR, 4.4; 95% CI, 1.1-10.1), Down syndrome (OR, 0.2; 95% CI, 0.1-0.8), attention-deficit/hyperactivity disorder (OR, 5.9; 95% CI, 2.5-14.3), pain (OR, 7.0; 95% CI, 2.9-17.1) and bully victimisation (OR 2.3; 95% CI, 1.0-5.3) were each associated with depression and/or anxiety problems. **CONCLUSIONS:** The present study identified both treatable and modifiable, as well as unmodifiable, factors associated with depression and/or anxiety problems in children with ID.

PMID: [30588708](#)

### 15. Health-related quality of life in Canadian children with cerebral palsy: what role does sleep play?

Horwood L, Li P, Mok E, Oskoui M, Shevell M, Constantin E.

Sleep Med. 2018 Nov 5;54:213-222. doi: 10.1016/j.sleep.2018.10.022. [Epub ahead of print]

**OBJECTIVE:** To evaluate, in Canadian children with cerebral palsy (CP): (1) health-related quality of life (HRQoL) as well as (2) associations between HRQoL and (a) sleep problems, (b) nighttime pain, and (c) child characteristics (eg, age, CP phenotype, comorbidities). **METHODS:** Children aged 3-12 years were recruited from neurology clinics and a provincial CP registry. Caregivers completed the Pediatric Quality of Life Inventory (PedsQL) Generic Core and CP Modules as well as the Sleep Disturbance Scale for Children (SDSC) to assess HRQoL and sleep, respectively. Child characteristics were extracted from hospital records and registry data. **RESULTS:** A total of 146 children with CP (mean age  $\pm$  standard deviation: 6.9  $\pm$  2.9 years) completed the study. Impaired HRQoL (scores more than 2 SDs below the normative population mean) on the PedsQL Total, Physical and Psychosocial Health scales was found in 33.6%, 38.4% and 17.6% of children, respectively. Non-ambulatory status, sleep problems and significant comorbidity were the strongest predictors of impaired Total HRQoL, with odds ratios (95% confidence intervals) of 30.1 (8.2-110.4), 3.8 (1.1-12.5) and 3.3 (1.2-9.2), respectively, adjusted for young age (5-7 years) and nighttime pain. Non-ambulatory status and sleep problems exclusively increased the risk of impaired physical and psychological health, respectively, with adjusted ORs (95% CIs) of 58.3 (11.9-284.5) and 7.5 (2.5-22.5). More severe sleep problems were associated with worse pain-related HRQoL. **CONCLUSIONS:** Sleep, non-ambulatory status and presence of comorbidities are important determinants of HRQoL in children with CP. Monitoring sleep, psychosocial functioning and pain is important in this population, as their management should improve HRQoL.

PMID: [30583275](#)

### 16. A cross-sectional survey of clinical factors that influence the use of traditional Korean medicine among children with cerebral palsy.

Lee HY, Yun YJ, Yu SA, Park YH, Park BW, Kim BY, Hwang MS.

Integr Med Res. 2018 Dec;7(4):333-340. doi: 10.1016/j.imr.2018.07.001. Epub 2018 Jul 26.

**BACKGROUND:** Traditional Korean medicine (TKM) is widely used to treat children with cerebral palsy (CP) in Korea; however, studies investigating factors that influence the use of TKM are scarce. Thus, we investigated the clinical factors that might influence the use of TKM. **METHODS:** A population-based, cross-sectional, multicenter survey was performed from August 2014 to May 2016. The history of TKM use, type and severity of CP, current treatment characteristics, presence of accompanying disabilities or other health problems not directly related to CP, and monthly cost for the treatment of CP were surveyed. **RESULTS:** In total, 182 children were recruited, and 78 children (42.9%) had used TKM. Among these 78 children, 50 (64.1% of the TKM-use group) had used both acupuncture and herbal medication, 15 (19.2%) had used acupuncture only, and 13 (16.7%) had used herbal medication only. Children with non-typical CP, accompanying disabilities and general health problems tended to use TKM. The monthly cost of treatment for CP was significantly higher in the TKM-use group than that in the no-TKM-use group, suggesting that economically disadvantaged children may have difficulty in accessing TKM. Dietary supplements, conventional pharmacological treatments, and rehabilitation therapies did not affect TKM use. **CONCLUSION:** Children with non-typical symptoms or those with poor overall health status are likely to use TKM. Additionally, TKM use leads to increased treatment costs. Studies investigating the motivation for starting or ceasing TKM therapy, socioeconomic factors and the attitude of parents towards complementary and alternative medicine should be performed.

PMID: [30591887](#)

**17. ACOG Committee Opinion No. 766: Approaches to Limit Intervention During Labor and Birth.**

[No authors listed]

Obstet Gynecol. 2018 Dec 19. doi: 10.1097/AOG.0000000000003074. [Epub ahead of print]

Obstetrician-gynecologists, in collaboration with midwives, nurses, patients, and those who support them in labor, can help women meet their goals for labor and birth by using techniques that require minimal interventions and have high rates of patient satisfaction. Many common obstetric practices are of limited or uncertain benefit for low-risk women in spontaneous labor. For women who are in latent labor and are not admitted to the labor unit, a process of shared decision making is recommended to create a plan for self-care activities and coping techniques. Admission during the latent phase of labor may be necessary for a variety of reasons, including pain management or maternal fatigue. Evidence suggests that, in addition to regular nursing care, continuous one-to-one emotional support provided by support personnel, such as a doula, is associated with improved outcomes for women in labor. Data suggest that for women with normally progressing labor and no evidence of fetal compromise, routine amniotomy need not be undertaken unless required to facilitate monitoring. The widespread use of continuous electronic fetal monitoring has not been shown to significantly affect such outcomes as perinatal death and cerebral palsy when used for women with low-risk pregnancies. Multiple nonpharmacologic and pharmacologic techniques can be used to help women cope with labor pain. Women in spontaneously progressing labor may not require routine continuous infusion of intravenous fluids. For most women, no one position needs to be mandated or proscribed. Obstetrician-gynecologists and other obstetric care providers should be familiar with and consider using low-interventional approaches, when appropriate, for the intrapartum management of low-risk women in spontaneous labor. Birthing units should carefully consider adding family-centric interventions that are otherwise not already considered routine care and that can be safely offered, given available environmental resources and staffing models. These family-centric interventions should be provided in recognition of the value of inclusion in the birthing process for many women and their families, irrespective of delivery mode. This Committee Opinion has been revised to incorporate new evidence for risks and benefits of several of these techniques and, given the growing interest on the topic, to incorporate information on a family-centered approach to cesarean birth.

PMID: [30575638](#)**18. [Long-term prognosis of neonates with necrotizing enterocolitis].**

Lin HJ, Shi LP, DU LZ.

Zhongguo Dang Dai Er Ke Za Zhi. 2018 Dec;20(12):985-989. [Article in Chinese]

**OBJECTIVE:** To investigate the long-term prognosis of neonates with necrotizing enterocolitis (NEC). **METHODS:** A total of 83 preterm infants with NEC who survived and were discharged between December 2014 and September 2016 were enrolled and divided into surgery group (n=57) and non-surgery group (n=26). There were 0, 33 and 24 cases of stage I, II and III NEC respectively in the surgery group and 7, 19 and 0 cases respectively in the non-surgery group. The physical development and neurodevelopmental outcomes of the infants were followed up after discharge. **RESULTS:** Of the 83 infants, the mean corrected age at the end of follow-up was 21±6 months. Of the 83 infants, 31 (37%) had subnormal body weight, and the surgery group had a higher rate of subnormal body weight than the non-surgery group (P<0.05). Twenty-two infants (27%) had subnormal body length and 14 children (17%) had subnormal head circumference among the 83 infants. Eighteen infants (22%) had motor developmental delay/developmental disorders, and the surgery group had a higher incidence rate of the disorders than the non-surgery group (28% vs 8%; P<0.05). Five infants (6%) were diagnosed with cerebral palsy, among whom 4 were in the surgery group and 1 was in the non-surgery group. **CONCLUSIONS:** Long-term physical development and neurodevelopmental outcomes may be adversely affected in neonates with NEC, in particular in those with severe conditions who need surgical treatment, suggesting that long-term follow-up should be performed for neonates with NEC.

PMID: [30572985](#)**19. "Learn From Every Patient": How a Learning Health System Can Improve Patient Care.**

Noritz G, Boggs A, Lowes LP, Smoyer WE.

Pediatr Qual Saf. 2018 Sep 5;3(5):e100. doi: 10.1097/pq9.000000000000100. eCollection 2018 Sep-Oct.

**AIM:** We created a Learning Health System, the "Learn From Every Patient" program, embedded in our cerebral palsy team clinic. This program was designed to simultaneously provide clinical care while systematically collecting data for quality improvement and research projects on all patients. **METHOD:** Clinicians created tools within the Electronic Health Record to



discretely capture data for clinical use which was also available for quality improvement/research efforts. At baseline, all patients in our clinic received annual hip x-rays to screen for hip displacement. Using our "Learn From Every Patient" database, we reviewed the outcomes for the most mildly affected patients, Level I on the Gross Motor Functional Classification System. RESULTS: One hundred thirty-two patients were classified as Gross Motor Functional Classification System Level I. During the study period, these patients received 212 pelvis x-rays, viewing 424 hips, of which 419 (98.8%) were normal. Five hips (1.2%) had < 30% displacement. None had any hip-related symptoms nor required any procedures during the period. We used these data to create an evidence-based change in our standardized hip screening procedure by eliminating annual screening x-rays for this population. INTERPRETATION: This implementation of a local learning health system approach to systematically collect research data simultaneously with routine clinical care enabled us to implement an evidence-based improvement in clinical practice. This complete integration of research into clinical care improved care by reducing radiation exposure, while simultaneously reducing health care costs.

PMID: [30584627](#)

## **20. Use of a Developmental Milestone Chart (DMC) in Rural Bangladesh to Educate Health Workers and Stimulate Referral for Early Diagnosis and Intervention.**

Karim T, Scherzer A, Muhit M, Badawi N, Khandaker G.

J Trop Pediatr. 2018 Dec 19. doi: 10.1093/tropej/fmy073. [Epub ahead of print]

We aimed to determine the feasibility of using a simplified Developmental Milestone Chart (DMC) for assessment of neurodevelopmental status of children of age  $\geq 1$  month and  $\leq 8$  years. Participants were assessed by medical practitioners using DMC as part of regular health checkups in three sub-districts in Bangladesh between January and May 2017. Total 256 children were recruited (41.0% girls, mean age  $1.3 \pm 1.6$  years). Total 107 children (41.8%) failed at least one and 3 (1.2%) failed all four developmental milestones. Majority missed motor milestones (75.6%,  $n = 81$ ). Four medical practitioners trained on the use of DMC deemed it to be an appropriate tool for developmental screening as part of regular health checkups/care in terms of acceptability, practicality and implementation. In countries with limited facilities, a simplified instrument such as the DMC can be administered by medical practitioners in rural settings. However, further studies are required to establish the validity of DMC before it could be adopted into routine clinical practices.

PMID: [30590812](#)

## **21. Erratum to: Socioeconomic Status Influences Functional Severity of Untreated Cerebral Palsy in Nepal: A Prospective Analysis and Systematic Review.**

LeBrun DG, Banskota B, Banskota AK, Rajbhandari T, Baldwin KD, Spiegel DA.

Clin Orthop Relat Res. 2019 Jan;477(1):262-263. doi: 10.1097/CORR.000000000000553.

PMID: [30586066](#)

## **22. Gardnerella vaginalis in perinatology: An overview of the clinicopathological correlation.**

Wong YP, Tan GC, Wong KK, Anushia S, Cheah FC.

Malays J Pathol. 2018 Dec;40(3):267-286.

*Gardnerella vaginalis* (GV) is a facultatively anaerobic gram-variable bacillus and is the major organism involved in bacterial vaginosis. GV-associated bacterial vaginosis has been associated with adverse pregnancy outcomes include preterm parturition and subclinical chorioamnionitis. Inflammatory response induced by GV presents paediatric problems as well. Studies had shown that increased levels of proinflammatory cytokines include TNF- $\alpha$ , IL-1 $\beta$  and IL-6 following fetal inflammatory response syndrome secondary to GV-induced intrauterine infection may result in the development of periventricular leukomalacia and bronchopulmonary dysplasia in the infected fetus. There is increasing evidence that GV-associated BV infection serves as a risk factor for long-term neurological complications, such as cerebral palsy and learning disability. GV is fastidious and could elude conventional detection methods such as bacterial cultures. With current more sophisticated molecular biology detection methods, its role and pathogenic effects have been shown to have a greater impact on intrauterine inflammation and fetal/neonatal infection. This review gives an overview on the characteristics of GV and its virulence properties. Its detrimental role in causing unfavourable GV-related perinatal outcomes, with emphasis on the possible

mechanistic pathways is discussed. The discovery of disease mechanisms allows the building of a strong platform where further research on innovative therapies can be based on, for instance, an anti-TLR monoclonal antibody as therapeutic agent to halt inflammation-precipitate adverse perinatal outcomes.

PMID: [30580358](#)

### **23. Movement Velocity and Fluidity Improve after Armeo®Spring Rehabilitation in Children Affected by Acquired and Congenital Brain Diseases: An Observational Study.**

Biffi E, Maghini C, Cairo B, Beretta E, Peri E, Altomonte D, Mazzoli D, Giacobbi M, Prati P, Merlo A, Strazzer S.

Biomed Res Int. 2018 Nov 18;2018:1537170. doi: 10.1155/2018/1537170. eCollection 2018.

**BACKGROUND:** Children with cerebral palsy (CP) and acquired brain injury (ABI) often exhibit upper limb impairment, with repercussions in their daily activities. Robotic rehabilitation may promote their functional recovery, but evidence of its effectiveness is often based on qualitative functional scales. The primary aim of the present work was to assess movement precision, velocity, and smoothness using numerical indices from the endpoint trajectory of Armeo®Spring. Secondly, an investigation of the effectiveness of robotic rehabilitation in CP and ABI children was performed. **METHODS:** Upper limb functional changes were evaluated in children with CP (N=21) or ABI (N=22) treated with Armeo®Spring (20 45-minute sessions over 4 weeks) using clinical scales and numerical indices computed from the exoskeleton trajectory. **RESULTS:** Functional scales (i.e., QUEST and Melbourne) were sensitive to changes produced by the treatment for the whole study group and for the two etiology-based subgroups (improvements above Minimal Clinically Importance Difference). Significant improvement was also observed in terms of velocity, fluidity, and precision of the movement through the numerical indices of kinematic performance. Differences in the temporal evolution of the motor outcome were highlighted between the ABI and CP subgroups, pointing toward adopting different rehabilitative protocols in these two populations. **CONCLUSIONS:** Robot-assisted upper limb rehabilitation seems to be a promising tool to promote and assess rehabilitation in children affected by acquired and congenital brain diseases.

PMID: [30581845](#)

### **24. Rehabilitation treatment of spastic cerebral palsy with radial extracorporeal shock wave therapy and rehabilitation therapy.**

Lin Y, Wang G, Wang B.

Medicine (Baltimore). 2018 Dec;97(51):e13828. doi: 10.1097/MD.00000000000013828.

This aims to investigate the effect of combined use of radial extracorporeal shock wave therapy (rESWT) and conventional rehabilitation therapy on postoperative rehabilitation of children with spastic cerebral palsy. Children with spastic cerebral palsy 6 weeks after multistage surgery were randomly divided into treatment group (received rESWT and conventional rehabilitation therapy) and control group (received conventional rehabilitation only). Before treatment, 2 weeks and 1 month after treatment, the Gross Motor Function Measure (GMFM), modified Ashworth Scale (MAS) of the hamstrings and triceps, plantar area and plantar pressure were examined for efficacy assessment. A total of 82 children with spastic cerebral palsy were recruited, including 43 children in treatment group and 39 children in control group. There was no significant difference in the age, MAS score, and GMFM score between the 2 groups before treatment. There were statistically significant differences between the 2 groups at 2 weeks and 4 weeks after treatment, including the MAS score, GMFM score, plantar area and plantar pressure ( $P < .05$ ). Within groups, there were also significant differences at different times ( $P < .05$ ). The rESWT combined with rehabilitation can quickly and effectively relieve paralysis of lower extremities, reduce the tension of hamstrings and calf muscles, relieve muscle spasm, and rapidly improve limb function in children with spastic cerebral palsy.

PMID: [30572548](#)

### **25. Transcranial direct current stimulation for promoting motor function in cerebral palsy: a review.**

Fleming MK, Theologis T, Buckingham R, Johansen-Berg H.

J Neuroeng Rehabil. 2018 Dec 20;15(1):121. doi: 10.1186/s12984-018-0476-6.

Transcranial direct current stimulation (tDCS) has the potential to improve motor function in a range of neurological

conditions, including Cerebral Palsy (CP). Although there have been many studies assessing tDCS in adult stroke, the literature regarding the efficacy of tDCS in CP is more limited. This review therefore focuses on the neurophysiological and clinical findings in children and adolescents with CP. Initial studies applying anodal tDCS to promote lower limb function are promising, with improvements in gait, mobility and balance reported. However, the results of upper limb studies are mixed and more research is needed. Studies investigating neurophysiological changes or predictors of response are also lacking. Large-scale longitudinal studies are needed for the lower limb to ascertain whether the initial pilot results translate into clinically meaningful improvements. Future studies of the upper limb should focus on determining the optimal stimulation parameters and consider tailoring stimulation to the individual based on the (re)organisation of their motor system.

PMID: [30572926](#)

## **26. The effect of mannitol in the early stage of supratentorial hypertensive intracerebral hemorrhage: a systematic review and meta-analysis.**

Sun S, Li Y, Zhang H, Wang X, She L, Yan Z, Lu G.

World Neurosurg. 2018 Dec 18. pii: S1878-8750(18)32818-3. doi: 10.1016/j.wneu.2018.11.249. [Epub ahead of print]

**BACKGROUND:** Mannitol has been widely applied as a priority drug in the clinical treatment for brain edema and increased intracranial pressure (ICP) after intracerebral hemorrhage (ICH). However, no consensus on the efficacy and safety of mannitol has been achieved. Our meta-analysis was conducted to assess the effect of mannitol in the early stage of supratentorial hypertensive intracerebral hemorrhage (HICH) and provided a treatment reference for clinicians. **METHOD:** All relevant studies on mannitol treatment of supratentorial HICH were identified from the databases including PubMed, EMBASE, Cochrane Library, VIP, CNKI and Wan Fang. Our outcome measures included the incidence of hematoma enlargement, the neurological function improvement rate, mortality and the incidence of aggravated brain edema. The subgroup analysis was performed to explore the impact of study type, year of publication, intervention time and dose on the outcome measures. Publication bias was assessed by the funnel plot. **RESULTS:** Thirty-four studies consisting of 3627 patients with supratentorial HICH were included in this study (range from 2000 to 2018). Significant statistical difference was found between mannitol and non-mannitol group in terms of all the outcome measures, including the incidence of hematoma enlargement ( $p < 0.00001$ ), the neurological function improvement rate ( $p < 0.00001$ ), mortality ( $p < 0.00001$ ) and the incidence of aggravated cerebral edema ( $p = 0.0002$ ). In subgroup analysis, the results showed study type and intervention time did not significantly affect the outcome measures. No significant statistical difference was found in the subgroups of publication time (after 2010) ( $p = 0.08$ ) and half-dose of mannitol ( $p = 0.20$ ) on mortality. In addition, the further analysis showed whatever the dose (250ml and 125ml) and intervention time ( $<24h$ ,  $<12h$ ,  $<6h$ ) was, mannitol could lead to the hematoma enlargement. **CONCLUSION:** For patients without obvious symptoms of intracranial hypertension or cerebral palsy, it is not recommended to use mannitol routinely in the early stage of supratentorial HICH. More high-quality trials should be included to confirm our conclusion and to ascertain the best time and dose of mannitol to use.

PMID: [30576817](#)

## **27. Crossed Cerebellar Atrophy in Perinatal Stroke.**

Craig BT, Olsen C, Mah S, Carlson HL, Wei XC, Kirton A.

Stroke. 2018 Dec 10;STROKEAHA118022423. doi: 10.1161/STROKEAHA.118.022423. [Epub ahead of print]

**Background and Purpose-** Perinatal stroke causes most hemiparetic cerebral palsy and lifelong disability. Crossed cerebellar atrophy (CCA) is chronic cerebellar volume loss following contralateral motor pathway injury. We hypothesized that CCA is quantifiable in perinatal stroke and associated with poor motor outcome. **Methods-** Term-born children with perinatal stroke, magnetic resonance imaging beyond 6 months of age, and no additional neurological disorders were recruited. Blinded scorers measured cerebellar volumes expressed as ratios (contralesional/ipsilesional), with values  $<1$  suggesting CCA. Motor outcomes including perinatal stroke outcome measure (PSOM) motor and cognitive scores (good/poor), Assisting Hand Assessment, and Melbourne Assessment were compared with cerebellar volume measures. **Results-** Seventy-three children met criteria (53% male). Mean cerebellar ratios were  $<1.0$  ( $0.975 \pm 0.04$ ; range, 0.885-1.079;  $P < 0.001$ ) suggesting occurrence of CCA. Cerebellar ratios did not differ between stroke types or across PSOM motor outcomes. Larger ipsilesional cerebellar volume was associated with poor PSOM cognitive outcome ( $P = 0.042$ ), possibly with poor PSOM motor outcome ( $P = 0.063$ ), and overall PSOM score ( $P = 0.034$ ). **Conclusions-** CCA occurs in perinatal stroke but is not strongly associated with motor outcome. However, ipsilesional cerebellar volume is associated with poor cognitive and overall outcomes.

PMID: [30580726](#)

## 28. Cutoff Points, Sensitivities, and Specificities of Intraoperative Motor-Evoked Potential Monitoring Determined Using Receiver Operating Characteristic Analysis.

Tanaka S, Akimoto J, Hashimoto R, Takanashi J, Oka H.

J Neurol Surg A Cent Eur Neurosurg. 2018 Dec 24. doi: 10.1055/s-0038-1676623. [Epub ahead of print]

**BACKGROUND:** Although intraoperative motor-evoked potential (MEP) monitoring is widely performed during neurosurgical operations, evaluating its results is controversial. **STUDY AIMS:** The cutoff point of MEP monitoring should be determined not only to predict but also to prevent postoperative neurologic deficits. **MATERIAL AND METHODS:** MEP monitoring was performed during 484 neurosurgical operations for patients without definitive preoperative motor palsy including 325 spinal operations, 102 cerebral aneurysmal operations, and 57 brain tumor operations, all monitored by transcranial stimulation, and 34 brain tumor operations monitored under direct cortical stimulation. To exclude the effects of muscle relaxants on MEP, the compound muscle action potential (CMAP), measured immediately after transcranial stimulation or direct cortical stimulation at supramaximal stimulation of the peripheral nerve, was used for normalization. The cutoff points, sensitivity, and specificity of MEP recorded during neurosurgery were examined by receiver operating characteristic (ROC) analyses and categorized according to the type of operation and stimulation. **RESULTS:** In spinal operations under transcranial stimulation, amplitude reduction of 77.9% and 80.6% as cutoff points for motor palsy with and without CMAP normalization, respectively, provided a sensitivity of 100% and specificity of 96.8% and 96.5%. In aneurysmal operations under transcranial stimulation, cutoff points of 70.7% and 69.6% offered specificities of 95.2% and 95.7% with and without CMAP normalization, respectively. The sensitivities for both were 100%. In brain tumor operations under direct stimulation, cutoff points were 83.5% and 86.3% with or without CMAP normalization, respectively, and the sensitivity and specificity for both were 100%. **CONCLUSION:** An amplitude decrease of 80% in brain tumor operations, 75% in spinal operations, and 70% in aneurysmal operations should be used as the cutoff points.

PMID: [30583304](#)

## 29. Analysis of Malpractice Claims Involving Diagnostic and Interventional Neuroradiology.

Deckey DG, Eltorai AEM, Jindal G, Daniels AH.

J Am Coll Radiol. 2018 Dec 22. pii: S1546-1440(18)31406-6. doi: 10.1016/j.jacr.2018.10.022. [Epub ahead of print]

**BACKGROUND:** Radiologists are increasingly the subject of costly medical malpractice claims. As the field continues to expand to include numerous minimally invasive procedures and diagnostic studies, radiologists are more exposed than ever to medical malpractice. Despite this, little is known on the outcomes of these litigations. **METHODS:** A retrospective investigation of the VerdictSearch legal claims database was performed, examining litigations involving radiologists' interpretation of neuro-imaging and neurological procedures performed by radiologists (including interventional radiologists and diagnostic neuroradiologists). Allegations, outcomes, and payouts were examined. **RESULTS:** In total, 126 cases were analyzed. Mean age of plaintiffs was  $45 \pm 18.8$  years; 64 (50.8%) plaintiffs were men. Fifty-two (41%) cases listed irreversible brain damage as a complication. Paralysis and death were listed in 40 (32%) and 34 (27%) cases, respectively. In total, 44% (55) resulted in a defendant ruling, 25% (25) in a plaintiff ruling, 26% (33) in a settlement, and 5% (7) in a mixed decision. Total liabilities of the 126 cases were \$390,329,929, with individual awards ranging from \$50,000 to \$45,000,000. Median plaintiff award was \$2,877,847 (interquartile range: \$1,250,000-\$6,412,159; mean: \$8,446,547  $\pm$  \$13,036,244). Median settlement amount was \$1,950,000 (interquartile range: \$934,250-\$3,625,000; mean: \$2,455,250  $\pm$  \$1,951,549). **CONCLUSIONS:** This study is the first examination of legal claims involving neuroradiology. Over 50% of claims against radiologists end in provider loss, which is both financially costly and detrimental to physicians, practices, and institutions. This information may inform physicians regarding common diagnostic and interventional errors, and potentially minimize medicolegal risk.

PMID: [30584036](#)