

# 1st Cerebral Palsy Integrated Pathway UK Meeting (APCP / BSCOS) 18.6.21

## ABSTRACT BOOKLET - Poster presentations

	Authors	Abstract
1	Samantha Powles	<p><b>Virtual Baby Group: An invaluable Resource for the management of Cerebral Palsy in a pandemic</b></p> <p>The management of pre-school aged children with a diagnosis of Cerebral Palsy (CP) during the pandemic has been of ever-increasing challenge. Carers are in the early stages of learning handling skills to benefit their child, have often newly learnt of their child's diagnosis, and many feel they have lost their support network.</p> <p>Through providing a weekly therapy led 'Virtual Baby Group' we have been able to provide tailored input to empower carers to complete activities focussing on their gross and fine motor skills. The combined Physiotherapy and OT approach has been led through a virtual platform in line with Information Governance regulations and has consisted of 5-10 children with a confirmed diagnosis or clinical presentation of CP.</p> <p>The group runs in 5-6 week blocks with patient centred goals set and reviewed, scoring patient performance and satisfaction. Each family is provided with a home exercise programme that mirrors the activities completed in the group. Feedback from parents has repeatedly described the benefit of the social aspect of the group alongside the therapy.</p> <p>The group organisation and delivery has been electronic allowing it to continue to work remotely. It has provided an invaluable learning opportunity for staff and students.</p>
2	Nouran Abdou	<p><b>Predictors of communication outcomes in children with cerebral palsy – a prospective cohort study</b></p>

		<p><b>Aim</b> To explore the role of clinical factors as potential predictors of long term communication outcomes in children with cerebral palsy (CP) aged two to five years.</p> <p><b>Method</b> Participants were assessed by a Speech and Language Therapist (SLT) at two years in domains relating to motor impairment, cognition, and speech and language ability. Participants' communicative ability was classified at five years of age by an SLT through The Functional Communication Classification System (FCCS), Communication Function Classification System (CFCS), and Viking Speech Scale (VSS). Multivariable regression was used to assess the association between the factors measured at two years and classification level at five years.</p> <p><b>Results</b> A total of 80 children (56 males, 24 females) were included in the study. The age range was between 20 and 36 months (mean = 28.5, SD = 3.5) at the time of initial assessment, and 59 and 77 months (mean = 65.8, SD = 3.9) at the time of the follow-up. In the multivariable analysis, predictors of worse long term communication outcomes were: severe impairments in manual ability; higher gestational age; neonatal seizures; lower cognitive ability; lower expressive language ability; CP type (dyskinesia); smaller consonant inventories; tube-feeding; and normal vision.</p> <p><b>Conclusions</b> Clinical factors at two years of age may act as predictors of communicative ability at five years of age in children with CP. This renders the need for early intervention in order to improve communication before school age.</p>
3	ND Mackay, RJ King, S Cooke, CE Hill	<p><b>"Making the cut": An osteotomy technique using a bespoke contoured 3D printed cutting jig in a patient with Cerebral Palsy</b></p> <p><b>Introduction</b></p>

		<p>Cerebral palsy (CP) is the most common cause of chronic disability in children. Precise, planned osteotomies are important in multilevel surgery, but can be challenging due to unique anatomy associated with this patient group.</p> <p><b>Case</b> CPIP identified a 17 year old with spastic diplegia CP (GMFCS 3) with a painful migrated right hip, bilateral fixed flexion deformities of the knees with valgus on the left, and declining overall function. He was listed for multilevel surgery. His left knee deformity presented a unique challenge requiring multiplanar correction due to distorted underlying anatomy.</p> <p>A virtual osteotomy and subsequent creation of a custom 3D cutting jig was performed to accurately plan an osteotomy correcting valgus and anteversion and achieving extension. A trial run on a 3D printed saw bone was conducted, then pre-contouring of a distal femoral locking plate performed, which was sterilised and used intra-operatively. Intra-operatively the bespoke jig contoured accurately to the femur providing osteotomy cutting slots to achieve the desired correction. Improvements in the patient's limb alignment, pain and function were accomplished.</p> <p><b>Conclusion</b> 3D printed, patient specific cutting jigs can make complex deformity correction less technically challenging, whilst ensuring accuracy of correction, reducing surgical time and improving patient outcomes.</p>
4	Jacques Davis	<p><b>An audit of the CPIPS database and the impact of Covid-19 on red zone hips in the Greater Glasgow and Clyde Healthboard demographic</b></p> <p>An audit of the Cerebral Palsy Integrated Pathway database for Greater Glasgow and Clyde Health board in January 2021 assessed the impact of the Covid-19 pandemic on paediatric cerebral palsy patients, with hip Reimer's index of <math>\geq 40\%</math> (Red zone), which is the threshold for referral for a surgical opinion.</p> <p>34 patients out of 521 had a recorded Reimer's index of <math>\geq 40\%</math> in at least one hip.</p> <p>Functional classification showed the majority were non-walking children. 30 patients were GMFCS Level 5 and two each categorised as GMFCS levels 4 and 3. The dominant tone disorder was Spasticity in 65%, Dystonia in 26% and Mixed in 9%. Neurological impairment pattern was Total Body Involvement (TBI) in 26%, Quadriplegia in 65 and Diplegia in 9%.</p>

		<p>Vulnerable groups were officially shielded during the Covid-19 pandemic and this patient group exhibits a high frequency of medical co-morbidity. Epilepsy was present in 21%, gastro-oesophageal reflux disease in 15% with a further 18% required PEG feeding. Three children were dependent on home Oxygen dependency (9%).</p> <p>Planned elective operating capacity remains reduced and the Covid-19 pandemic has had an adverse impact by means of extending surgical waiting times for this vulnerable patient group from a mean of 5 months to <math>\geq 15</math> months.</p>
5	TL Lewis, K Patel, KL Shepherd, P MacInnes, R Ray, M Kokkinakis	<p><b>Hallux Valgus Surgery in Children with Cerebral Palsy: A Systematic Review</b></p> <p><b>Background</b> Children with cerebral palsy are highly likely to develop foot deformities, such as hallux valgus, which can cause issues with pain, footwear, orthotic splints and soft tissues. It remains unclear what the optimal surgical treatment is for children with cerebral palsy and hallux valgus deformity.</p> <p><b>Objective</b> To systematically review studies reporting the clinical and radiological outcomes of surgical correction of hallux valgus deformity in children with cerebral palsy.</p> <p><b>Methods</b> A systematic review of studies published in electronic databases (Medline, Embase, Pubmed and Cochrane library) from inception until January 2021. Keywords related to hallux valgus and cerebral palsy were included.</p> <p><b>Results</b> 56 studies were identified of which 7 met the criteria for inclusion. 200 feet in 134 patients with a mean age of 13.5 years were included, with a mean follow up period of 43 months. A range of clinical and radiographic outcomes were assessed. A treatment framework for the assessment and management of hallux valgus in children with cerebral palsy is presented.</p> <p><b>Conclusion</b> Non-ambulant children with cerebral palsy with symptomatic hallux valgus should primarily undergo first MTPJ arthrodesis whilst those who are ambulant should undergo first metatarsal osteotomy <math>\pm</math> soft tissue correction.</p>

		<b>PROSPERO registry:</b> CRD42021233718
6	J Lunan, L Sinclair, K Sweeney	<p><b>Measuring the impact of COVID-19 on a Physiotherapy led botulinum toxin-A service</b></p> <p><b>Introduction</b> In 2015, in collaboration between acute and community teams, a paediatric botulinum toxin service was established in NHS Greater Glasgow and Clyde. Children and young people (CYP) (GMFCS levels I-III or equivalent) are assessed by a trained physiotherapy injector at their nearest centre. The service benefits include, access to clinics closer to home, reduced waiting times and enhanced treatment outcomes. The aim of this study is to measure the impact of COVID-19 on this service.</p> <p><b>Methods</b> A service evaluation was conducted comparing data from April 2019 – March 2020 (T1) to April 2020 - March 2021 (T2). Outcomes compared were, referral rate, time from assessment to treatment, intervention outcomes.</p> <p><b>Results</b> 38 CYP were referred during T1 and 37 for T2. Median time from assessment to treatment for T1 and T2 was 4.6 and 8.1 weeks respectively. Additionally, 74% of CYP achieved their treatment goals in T1 and 78% during T2.</p> <p><b>Discussion</b> During the COVID-19 pandemic, time from assessment to treatment has considerably increased but treatment outcomes have remained equitable. It is too early to establish the long-term impact this will have on this population. We believe services such as ours need to consider their recovery plan to restore services to this group.</p>
7	P MacInnes, T Lewis, C Griffin, M Martinuzzi, K Shepherd, M Kokkinakis	<p><b>Surgical management of pes planus in children with cerebral palsy: a systematic review</b></p> <p><b>Background</b> Pes planus is a common deformity in children with cerebral palsy (CP). When conservative treatment fails, there are several surgical interventions for managing the condition: lateral column lengthening; calcaneal osteotomies; extra- and intra-articular arthrodesis, and arthroreisis.</p> <p><b>Objective</b></p>

		<p>To systematically review studies reporting radiological and clinical outcomes of the surgical management of pes planus in children with CP.</p> <p><b>Methods</b> MEDLINE, Embase, Cochrane, Web of Science and PubMed were searched to identify studies published from inception until February 2021, with keywords relating to pes planus, CP and surgical interventions.</p> <p><b>Results</b> 1219 studies were identified of which 46 met the criteria for inclusion. 2,181 feet in 1,344 patients were included, with a mean age of 10.4 and a mean follow-up period of 54.6 months. Clinical and radiological outcomes were stratified based on procedure type. Quality of included studies was variable with only 8 (17%) studies assessed as a low risk of bias. There was substantial heterogeneity of outcome measures.</p> <p><b>Conclusions</b> There is a lack of high-quality, comparative studies assessing the radiological and clinical outcomes of surgical alternatives to treat pes planus in children with CP. As of yet there is no clear consensus on the optimal surgical treatment of pes planus.</p>
8	AS Mishra, R Rajan	<p><b>The Effect of Selective Dorsal Rhizotomy On Gait Outcomes for Children with Cerebral Palsy</b></p> <p><b>Background</b> Management of spasticity is often challenging in children with Cerebral Palsy (CP), however selective dorsal rhizotomy (SDR) shows promising results in reducing spasticity. There are few studies investigating gait outcomes of SDR.</p> <p><b>Methods</b> This is a prospective study of 13 pre-selected ambulant children with CP who were suitable for SDR. 3D gait analysis was performed prior to SDR and 2 years post-SDR to assess gait parameters and calculate the gait profile score (GPS).</p> <p><b>Results</b></p>

		<p>The mean age at initial assessment was 6.7 (2.9 – 9.7) years. Pre-SDR mean GPS was 15.67° (10.8°-22.5°), and post-SDR mean GPS was 12.17° (7.4°-20.09°), demonstrating a mean improvement of 3.5° (0.4°-9.8°; p=0.0013). Walking speed and step length were normalised to shank length. Mean normalised walking speed improved from 0.42s-1 (0.19-0.7 s-1) to 0.48s-1 (0.13-0.82 s-1), indicating a mean improvement of 0.06s-1 (p=0.4801). Mean normalised step length also increased from 1.25 (0.8-1.6) to 1.37 (0.79-1.8), with a mean improvement of 0.11 (p=0.35).</p> <p><b>Conclusion</b> This study has shown that in a pre-selected group of children with CP, SDR is effective in improving gait parameters. Long-term studies are required to assess whether this improvement is sustained.</p>
9	VMY Wong-Spracklen, K Fairhead, K Swaminathan	<p><b>Retrospective Study of The Cerebral Palsy Integrated Pathway (CPIP) In North Hertfordshire NHS Trust</b></p> <p><b>Background</b> CPIP is a surveillance programme detecting early changes of joints by physical examinations in children with cerebral palsy (CP), to facilitate early interventions.</p> <p><b>Aims</b> To understand subtypes and functional classifications of our cohort when assessed at the CPIP clinics, and to evaluated interventions they received. Methodology: Retrospective study, including all children seen between 1 September 2018 and 31 December 2019 in the CPIP clinics.</p> <p><b>Results</b> 28 children were assessed. 20 (71%) male, 8 (29%) female. There were 24 children with spastic-type, 3 dystonic, 0 ataxic-type, 1 unidentified. 6 had hemiplegia, 16 diplegia, 5 with 4-limb involvement, and 1 non-documented. The functional classifications identified: 11 with GMFCS-1, 13 with GMFCS-2, 1 each in GMFCS-3&amp;5, and 2 GMFCS-4. Interventions recommended were all in the GMFCS-1 and 2 groups. In children with GMFCS-1, 3 were referred for Hip X-rays, Orthopaedics (2), Stretches (5) and</p>

		<p>Dietician (1). In GMFCS- 2 group, Hip X-Ray (1), Orthopaedics (3), Botox (3), 2 for Stretching (2) exercises and 1 for further medical assessment.</p> <p><b>Conclusion</b> Establishment of CPIP-clinics promoted better understanding of the types of Cerebral palsy. It facilitated multi-disciplinary teamwork, contributing to continuing care for such children. It highlighted the need for regular assessments even in better-ability children such as in GMFCS-1&amp;2.</p>
10	Lucy James	<p><b>Implementing the Cerebral Palsy Integrated Pathway to improve the care of children and young people with cerebral palsy: A Quality Improvement Project</b></p> <p>With a desire to support our team to implement CPIP, I undertook a Quality Improvement (QI) Fellowship with Health Education England Wessex in 2019-2020.</p> <p>We aimed to sustainably and seamlessly implement CPIP within our service; with no increase in resources we therefore recognised the need to work differently. The QI Fellowship offered valuable learning and dedicated time to help us navigate this complex multidisciplinary project. Staff and patient involvement throughout has helped us to make meaningful changes. For example, process mapping and parent interviews highlighted delays and variability in parents receiving x-ray result letters. The radiography team therefore suggested they e-mail the paediatrician when the x-ray is completed. This simple solution has improved patient care (figure 1), highlighting the importance of ideas coming from those directly involved, so that they embed in practice and are sustainable long term.</p> <p>We also piloted different physiotherapy CPIP clinic models, making small changes to maximise efficiency. A QI workshop then enabled us to review the changes together and discuss sustainability.</p> <p>We are proud of our progress so far, despite the challenges of COVID-19 (figure 2), and we hope that other teams will approach CPIP collaboratively to make meaningful and lasting changes to improve patient care.</p>



		<p>Figure 1. Number of days between a child's CPIP hip x-ray and results letter sent to parent / guardian</p> <p>Figure 2. CPIP Audit Results</p>
11	M van der Linden and M Gaston	<p><b>Description of leisure time physical activity (LTPA) in children and young people with cerebral palsy (CP) and identify factors influencing participation.</b></p> <p><b>Methods</b> Factors associated with LTPA participation were analysed using the data from the CIPPS register.</p> <p><b>Results</b> Fifty-four percent of the sample (n=1818) participated in LTPA. Overall, LTPA participation levels decreased with increasing Gross Motor Function Classification System (GMFCS) level, but there was no differences in LTPA levels between GMFCS level II and III. . The data demonstrated that the effect of age on LTPA participation varies among GMFCS levels. For example, LTPA in 11-18 year olds was significantly lower than those aged 5-10 and classified at GMFCS level II but higher for level IV. All barriers to participation except 'Challenging behaviour' were significantly associated with a lack of LTPA participation. 'Social factors' was the strongest predictor for non-participation.</p> <p><b>Conclusions</b></p>

		Data from the CIPPS register provide an in depth insight into the factors influencing LTPA participation in children and young people with CP and will inform strategies which may help to improve this.
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