Abstracts of Poster and Platform Presentations for the 2004 Combined Sections Meeting

■ POSTER PRESENTATIONS

CONSIDERATIONS IN PASSIVE STANDING PROGRAMS FOR CLIENTS WHO ARE MEDICALLY FRAGILE.

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BACKGROUND & PURPOSE: Standing is a recommended treatment method for persons unable to stand independently for a variety of medical or physical reasons, including increasing/maintaining bone density, improving bowel/bladder function, maintaining PROM, and improving postural control. Review of published data reveals that there is no established optimum daily schedule range to be used for training/maintaining endurance for standing in a person who is medically fragile.
CASE DESCRIPTION: Subject: 20 year old female with history of medical fragility following TBI, s/p (3.25 years) R frontotemporal craniotomy, s/p L frontal craniotomy, flaccid hypotonicity, tracheostomy, G-tube, diabetes insipidus, panhypopituitarism, hypothalamic storms during early rehabilitation, and autonomic dysregulation, including temperature control impairment.
METHODS AND MATERIALS: Digital blood pressure monitor (LifeSource UA 767), pulse oximeters (including Datex Ohmeda 3800), and stander (Easy Stand 5000 Series) with adaptations. Data was recorded by Physical and Occupational therapists. Parameters measured included Start/End BP, Start/High/Low Pulse Rate and Start/High/Low SpO2.
OUTCOMES: Analyses: Use of Microsoft Excel with Regression Analysis – scatter charts with trend lines.
RESULTS: Hypertension and decreased start/low SpO2 were directly related to amount of time between standing sessions. As exposure to interventions increased, incidence of negative outcomes decreased.
DISCUSSION: Results suggested that negative outcomes were most likely when there were 8 or more days between interventions, but increased hypertensive tendencies were noted by the 3rd day of non-participation. Previous studies made recommendations on frequency of intervention based on the desired benefits of the standing program. When considering a person with medical fragility, further attention to scheduling of the intervention may be required to prevent undesirable sequelae secondary to cardiovascular and pulmonary stress, yet still provide adequate stress to increase/maintain endurance. Caretakers need to be involved in assessing their ability to be consistent with a standing schedule before accepting a standing program. They require adequate training on how to safely reinstitute standing when the schedule is disrupted. To support consistency, choice of equipment should fit caretakers needs as well as those of the person receiving the intervention.

CONCURRENT VALIDITY OF THE ALBERTA INFANT MOTOR SCALE (AIMS) AND THE PEABODY DEVELOPMENTAL MOTOR SCALES II (PDMS II).

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PURPOSE/HYPOTHESIS: The purpose of this study was to evaluate the concurrent score validity of two measures commonly used to evaluate motor status, the Alberta Infant Motor Scales (AIMS) and the Peabody Developmental Gross Motor Scales (PDGMS II).
NUMBER OF SUBJECTS: Thirty-five predominantly African American infants, (age range of 2 to 15 months) at risk for motor delay were given the PDGMS II and AIMS. Mean birth weight was 1512 643 g (mean SD); mean chronological age (CA) of the sample was 35.4 17 weeks; corrected chronological age (CCA) was 24.5 16.7 weeks.
MATERIALS/METHODS: Two students and one early interventionist administered either the AIMS or PDGMS II. Next, a second set of two student examiners and an early interventionist administered the other test to the same infant. Pearson product-moment correlation was used to analyze the magnitudes of the relationship between scores on the PDGMS II subtests (reflex, locomotion and stationary) and the AIMS scores and for relationships between the PDGMS II subtests and total AIMS score based on CA and CCA of the children. Intraclass correlation coefficients (ICC) were used to evaluate interrater agreement and reliability of scores. The alpha level was $P < 0.05$ for all analyses.

CLINICAL RELEVANCE: Physical therapists should be engaged in teaching children with DCD complex skills such as bike riding. Therapists can provide unique contributions to the learning of complex tasks such as breaking down the skill into manageable sub-skills, and providing information to the learner regarding strategies of movement that would lead to success.

ASSESSMENT OF MUSCLE STRENGTH AND THE BONE MUSCLE UNIT OF THE TIBIA IN CHILDREN.

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PURPOSE/HYPOTHESIS: The purpose of this study was to compare measures of muscle cross-sectional area and muscle strength as they relate to bone mass and dimensions in children and adolescents.
NUMBER OF SUBJECTS: 20 healthy controls, 38 patients with nephrotic syndrome, 19 patients with Crohn's disease, 5–20 years old (mean 12.0 3.7)
MATERIALS/METHODS: Peripheral quantitative computed tomography (pQCT, Stratec XCT-2000) measures of cortical bone dimensions and content were obtained in the left tibia, 38% proximal to the growth plate. Muscle cross-sectional area (CSA, cm2) was measured at the 66% tibia site. Isometric muscle peak torque was measured at 10 of dorsiflexion, neutral, 10 and 20 of plantarflexion in the left ankle using the Biodex System 3 Dynamometer (Biodex, Shirley NY). The correlations between bone and muscle measures were assessed with Pearson product-moment estimates.
RESULTS: All 8 strength measures were significantly correlated with muscle CSA on pQCT: R2 0.62, $P <$ 0.001. The correlation with muscle CSA was greatest for dorsiflexion in 20 plantarflexion R2 = 0.81, $P < 0.001$. Comparisons of bone and muscle measures demonstrated that dorsiflexion in 20 of plantarflexion explained 87% and 84% of the variability in cortical bone content and cross-sectional area respectively. In contrast, muscle CSA explained 82% and 75% on the variability in these bone measures. The relationship between muscle strength and muscle CSA relative to tibia length was compared across the 3 groups; no differences were detected.
CONCLUSIONS: The correlations between measures of isometric muscle strength and bone are greater than the correlations between muscle CSA and bone. Future studies are needed in larger populations with derangements in muscle mass and strength, such as glucocorticoid-induced myopathy, edema, renal failure and neuropathies.
CLINICAL RELEVANCE: Strength measures may be useful in determining the need for physical therapy intervention in children with nephrotic syndrome and Crohn's disease. These strength measures may provide additional insight into the impact of chronic diseases on bone mineral accretion.

BIMANUAL COORDINATION DURING A GOAL-DIRECTED TASK IN CHILDREN WITH HEMIPLEGIC CEREBRAL PALSY.

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PURPOSE/HYPOTHESIS: The purpose of this investigation was to examine temporal synchronization and movement overlap of the two hands under speed, hand, and accuracy constraints in children with hemiplegic cerebral palsy (CP) and to compare their performance to age-matched typically developing children.
NUMBER OF SUBJECTS: Ten children with hemiplegic CP (8 to 16 years of age) and ten age-matched typically developing children participated in this study.
MATERIALS/METHODS: Children were asked to reach forward and open a spring-loaded drawer with one hand and then activate a light switch inside the drawer with the contralateral hand while the 3-D kinematics were recorded. The role of the two hands (which hand opens the drawer), the type of drawer handle (knob versus loop), light switch size (large versus small) and speed (self-paced versus fast-as-possible) were varied. Repeated measures ANOVAs with one between factor (2 groups) and four within factors 2(hand) $\times$ 2(handle) $\times$ 2(switch) $\times$ 2(speed) were used on all measures. Post-hoc comparisons were carried out using the Tukey procedure.
RESULTS: The children with hemiplegic CP displayed slower and more sequential movement of the two hands compared to the typically developing children ($P < 0.001$ in all cases). They also showed less overlapping movement of the two hands (group x hand, $P = 0.003$) but better synchronization at task completion (group x hand, $P = 0.011$) when their involved hand opened the drawer than when the non-involved hand did so. The children with hemiplegic CP demonstrated better synchronization of the two hands at task completion for the small light switch compared to the large one while using the knob handle under self-paced speed (group x handle x switch x speed, $P = 0.049$). In contrast, they performed better with larger switch under the fast-as-possible speed (post-hoc, $P < 0.05$). The fast-as-possible speed facilitated better movement overlap and temporal synchronization for both groups in all cases ($P < 0.001$).
CONCLUSIONS: Children with hemiplegic CP have impaired bimanual coordination. The degree of impairment depended on the role of the hands, the task constraints, and speed.
CLINICAL RELEVANCE: Therapist should vary these constraints carefully to facilitate better performance.

USE OF CRANIOSACRAL THERAPY TO TREAT INFANT POST-TRAUMATIC TORTICOLLI.

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BACKGROUND & PURPOSE: To describe the use of craniosacral therapy (CST) to improve ROM and posture

in an infant with post-traumatic torticollis and C1–2 subluxation.
CASE DESCRIPTION: A typically developing 6-week-old male experienced head and neck compression when his car seat overturned during a MVA. At 4 months, he was diagnosed with traumatic torticollis. At 9 months, CT scan revealed C1–2 subluxation. Following spinal manipulation under general anesthesia, he was placed in a halo brace with a headband. Two weeks later, he began PT. After 8 weeks in the halo, a repeat CT scan revealed no subluxation improvement. After 2 1/2 months of traditional PT, the patient showed minimal improvement in cervical ROM. At 16 months, his physician recommended that, in the absence of significant improvement, a C1–2 fusion be performed after age 18 to 24 months. The child was then referred to a PT skilled in CST. Examination findings were consistent with the mechanism of injury. The frontal bone was noted to be more anterior on the left than the right, consistent with a lateral strain pattern of the cranial base. Cranial vault palpation revealed lateral spheno-basilar torsion. Dural tube assessment revealed a pronounced abnormal torsion from the cranium to the sacrum. Craniosacral therapy, including cranial base mobilization, sacral decompression, dural tube release, occipito-atlas release, and still point induction, was added to his treatment program 1–2 times a week, following CST guidelines for treatment of infants and small children.
OUTCOMES: Posture and ROM improved markedly in the first 4 weeks. Treatment continued weekly for 6 more months with consistent, though less dramatic, progress. Digital overlays of photographs allow comparative estimates of improvement. At discharge, patient achieved neutral head and neck posture in times of quiet standing and AROM beyond neutral in inversion. Mild asymmetry was still evident in stand-to-squat and in times of dynamic play. The child was discharged at nearly 24 months of age, with no imminent plans for additional CT scans or surgical intervention, to a hippotherapy program.
DISCUSSION: While considerable literature exists on physical and surgical interventions for congenital torticollis, little is written on the treatment of traumatic torticollis in very young children. In this case, CST appeared to be an effective intervention for improving cervical posture and ROM in an infant with post-traumatic torticollis.

PERFORMANCE ON THE STANDARDIZED WALKING OBSTACLE COURSE (SWOC) FOR MATCHED PAIRS OF CHILDREN WITH CEREBRAL PALSY AND TYPICAL DEVELOPMENT.
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PURPOSE/HYPOTHESIS: The purpose was to examine the normative data on the Standardized Walking Obstacle Course (SWOC), supporting its construct validity (known groups) as a test of functional ambulation and balance in children with and without disabilities.
NUMBER OF SUBJECTS: Children with cerebral palsy (CP) and typical development ($n = 17$ pairs) were matched for age (range 5–15 years; mean 8 years, 8 months), gender (9 female pairs, 8 male pairs), and body mass index (range 14.66–26.31 kg/m2; mean 18.14 kg/m2).
MATERIALS/METHODS: The SWOC is a 39.5 foot long and 36 inch wide angled path with chairs at each end, surface changes (shag rug, very colorful mat), and obstacles (large trash can, standard crutch). Children were randomly assigned a start condition on the SWOC: arms free, carrying a lunch tray with place setting, and wearing shaded glasses walking for a total of six trials. The time and number of steps to complete the course, stumbles, and steps off the path were recorded. ANOVA was used to analyze the effects of group and condition on the SWOC on time and number of steps. Chi-Square was used to determine whether stumbles and steps off were associated with both group and condition. **RESULTS:** For time and number of steps, there were significant main effects for group and condition (F 24.6, $P < 0.0001$; F 73.9, $P < 0.0001$, respectively) and an interaction effect (F 13.2, $P > 0.0001$). There were average increases in time and number of steps (46% and 35%, respectively) for children with CP across all three conditions. Chi-Square Tests of Independence were significant for steps off (2 42.5, $P < 0.0001$) and stumbles (2 40.5, $P < 0.0001$). Only 10% of the children with CP had no steps off compared to 71% of their peers. 57% of the children with CP had one or more stumbles compared to 100% of their peers with no stumbles.
CONCLUSIONS: There were highly significant differences on all measures of the SWOC between children with CP and typical development. The interaction effect, while highly significant, showed no differences in the relative ranking of the groups for the different conditions of the SWOC. Therefore, children with CP on all conditions of the SWOC took longer, used more steps, and had more stumbles and more steps off the path than their peers.
CLINICAL RELEVANCE: For this group of children, the SWOC was able to distinguish the children with CP from those developing typically on functional gait and balance.

THE EFFECTS OF OBSERVATIONAL FEEDBACK ON MOTOR LEARNING OF AN AIMED REACHING TASK.
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BACKGROUND & PURPOSE: Observational feedback has a positive effect on motor learning, however, the best means of delivering feedback is under debate. Thus, the