questionnaires based on musculoskeletal and neuromuscular concepts as well as general questions about physiatry.
Setting: This study was conducted at a private medical school in the Chicago area.
Participants: The participants were first- and second-year medical students who attended the Musculoskeletal and Neuromuscular lecture day of their Physical Diagnosis class, respectively.
Interventions: Each medical student class was given a pretest questionnaire to evaluate their baseline knowledge. Each class received a 1-hour physiatry-based lecture on basic concepts of either the musculoskeletal examination for first-years medical students or the neuromuscular examination for second-year medical students. The class was then divided into small groups, and the students attended a 2-hour hands-on interactive experience with physiatry residents to practice performing their physical examination skills.
Main Outcome Measures: The participants of each class were administered an identical questionnaire, first as a pretest questionnaire and then as a posttest questionnaire. The posttest results were compared to the pretest results.
Results: The average for first-year medical students' posttest results improved by 24%, and the average for second-year medical students' posttest results improved by 14%. In addition, 11 second-year medical students and 15 first-year medical students requested more information about PM&R.
Conclusions: This study indicates that a physiatry-based lecture and an interactive experience with physiatrists is an effective way to teach medical students the musculoskeletal and neuromuscular examination and introduce them to the field of PM&R. A more-effective approach to teaching students may include exposing medical students to PM&R during their first year of medical school by teaching the musculoskeletal examination and then returning during their second year to teach the neuromuscular examination.

Poster 260

Intrathecal Baclofen for Severe Spasticity in Patients With Upper Motor Neuron Disease.

Francois A. Bethoux, MD (The Cleveland Clinic Foundation, Cleveland, OH, United States); Mariam Hussain, Darlene Stough, Matthew Sutliff, PT.

Disclosures: F. A. Bethoux, Medtronic Inc, research grants; Medtronic Inc, consulting fees or other remuneration; Medtronic Inc, speakers bureau; Allergan, speakers bureau; Allergan, consulting fees or other remuneration; IMPAX Laboratories, consulting fees or other remuneration.
Objective: To assess the efficacy and safety of intrathecal baclofen therapy (ITB) for severe spasticity in a cohort of patients with upper motor neuron predominant motor neuron disease (MND).
Design: Retrospective study with historical controls.
Setting: Outpatient spasticity clinic in an academic center.
Participants: Patients with MND and with severe spasticity (n=35), some of whom subsequently initiated ITB therapy (ITB group, n=20), whereas others chose more conservative therapy (non-ITB group, n=15).
Interventions: ITB therapy.
Main Outcome Measures: Modified Ashworth Scale (MAS), self-report Spasm Frequency Scale (SFS), Numerical rating scale (NRS) for pain, hip flexor manual muscle testing, and Timed 25-Foot Walk Test (T25FW). Data were collected at baseline, early follow-up (ITB group only, <3 months) and late follow-up (both groups, 3 months to 1 year).
Results: At baseline, there were no significant between-group differences, with the exception of lower NRS pain scores in the non-ITB group ($P=.02$). At late follow-up, there was a significantly greater reduction in MAS scores ($P<.0001$), NRS pain scores ($P=.04$), and number and dose of oral medications for spasticity ($P<.003$) in the ITB group. There was no significant difference in progression of hip flexor weakness ($P=.48$) and the same percentage (40%) of patients in the ITB group and the non-ITB group changed from an ambulatory to nonambulatory status. At early follow-up, there was a significant reduction in MAS scores ($P<.0001$), SFS scores ($P=.0005$), NRS pain scores ($P=.001$), number and dose of oral medications for spasticity ($P<.0071$) compared with baseline within the ITB group. There was 1 catheter-related complication, which resolved without sequelae after surgical revision, and no patients chose to discontinue ITB therapy.
Conclusions: Our results suggest that the safety and efficacy of ITB in patients with MDN is comparable with what has been reported in other patient populations. In our patients, ITB therapy significantly reduced spasticity but did not cause increased progression of hip flexor weakness or loss of ambulation compared with patients with MND without ITB therapy.

Poster 261

The Prevalence of Constipation as Reported by Adults With Cerebral Palsy.

Marshall T. Poole, DO (University of Michigan, Ann Arbor, MI, United States); Margy A. Fox, MS, Heidi J. Haapala, MD, Edward A. Hurvitz, MD.

Disclosures: M. T. Poole, none.
Objective: Constipation is a significant problem for adults with cerebral palsy (CP), often affecting quality of life. Complications such as bowel obstruction can lead to hospitalization and even death. Prevalence has been reported up to 67% but without standardized measures. The Patient Assessment of Constipation Symptom questionnaire (PAC-SYM) is a validated self-report measure for classifying severity of constipation. Our objective was to identify the prevalence of constipation in a population of adults with CP who were able to self-report symptoms. A second objective was to evaluate relationships between Gross Motor Function Classification System (GMFCS) level, body mass index, and symptoms of constipation.
Design: A cross-sectional survey study.
Setting: Adult CP physiatry clinic at a tertiary care center.
Participants: Participants were a convenience sample of adults with CP.
Interventions: None.
Main Outcome Measures: Survey data of adults (aged 18 and older) with CP culled from a larger database was evaluated. A cohort of 52 individuals with initial PAC-SYM scores was identified. Individuals who were unable to self-report were not administered the PAC-SYM questionnaire and therefore were not included in this study. Global and subcategory (abdominal, stool, or rectal symptoms) PAC-SYM scores were calculated and then assessed by GMFCS level. Standard parametric statistics were used to evaluate for association.
Results: Of all patients surveyed, 47% reported some symptoms of constipation. Global PAC-SYM scores ranged from 0.16-2.6 (mild

to moderate). Subjects with decreased functional mobility (GMFCS III-V) had a significantly higher rate of constipation compared with those at GMFCS level I and II ($P=.01$). However, among subjects with symptoms, the PAC-SYM scores did not differ significantly between those groups. The mean body mass index was 27.2 and did not differ based on presence or severity of constipation.

Conclusions: This study suggests a high prevalence of constipation in adults with CP. Prevalence, but not necessarily severity, increases as functional mobility worsens. Body mass index was not correlated with constipation.

Poster 262

Balance Treatments in Subjects With Multiple Sclerosis: Effects of Physical Therapy Interventions With and Without Biofeedback and/or Forceplate Training.

Giampaolo Brichetto, MD, PhD (Italian Multiple Sclerosis Society, Genova, Italy); Mario Alberto A. Battaglia, Damiano Costa, Laura Lopes de Carvalho, MD.

Disclosures: G. Brichetto, none.

Objective: Balance disorders are frequently observed in subjects with multiple sclerosis (MS), which leads to impaired balance and increased risk of falls. Visual biofeedback and/or forceplate systems are often used for treatment of balance disorders. In this study, we investigated the addition of visual and biofeedback and/or forceplate training in enhancing the effects of other physical therapy interventions on balance in subjects with MS.

Design: The study included 20 subjects with MS, according to McDonald Criteria, followed up as outpatients at AISM Rehabilitation Centre. The subjects were randomly assigned to either an experimental group or a control group when the study began. Multivariate statistical analysis was used to assess the effects of TREATMENT and TIME and the interaction TIME*TREATMENT.

Setting: Subjects followed up as outpatients at AISM Rehabilitation Centre, Genova, Italy.

Participants: 20 subjects with clinically definite MS.

Interventions: The experimental group trained on the NeroCom Balance Master for 45 minutes every session, twice a week for 5 weeks. The control group received traditional physical therapy for 45 minutes every session, twice a week for 5 weeks.

Main Outcome Measures: All the subjects were evaluated with EDSS, Modified Fatigue Impact Scale (MFIS), Berg Balance scale (BERG), Equitest (NeuroCom) –Sensory Organization Test (SOT) and Motor Control Test (MCT) – and Balance Master (NeuroCom). Main outcomes were: MFIS, BERG, SOT, and MCT.

Results: After intervention, both groups scored higher on the Berg Balance Scale, Modified Fatigue Impact Scale, and Sensory Organization Test (Equitest NeuroCom), with a $P<.05$. Furthermore, multivariate analysis showed a greater improvement in the experimental group for the Berg Balance Scale and the Sensory Organization Test.

Conclusions: Our results indicate that physical therapy is helpful for improving balance in subjects with MS with an additional effect of biofeedback and/or forceplate training. Biofeedback and/or forceplate training should be a part of multimodal approach to balance disorders treatments in subjects with MS.

Poster 263

Decline in Motor Prediction in Subjects With Multiple Sclerosis: Upper Limb Mentally Simulated Motor Actions and Implications in Physical Therapy.

Giampaolo Brichetto, MD, PhD (Italian Multiple Sclerosis Society, Genova, Italy); Mario Alberto A. Battaglia, Marco Bove, Andrea Tacchino.

Disclosures: G. Brichetto, none.

Objective: Motor imagery is a state of mental rehearsal during which a subject replicates a motor action without moving limbs. Internal simulation of single movements has been shown to recruit neural networks that overlap with those activated during overt movement performance. In this study, we investigated motor prediction in subjects with multiple sclerosis (MS) at a very early stage of the disease to compare it with healthy subjects and implications in physical therapy.

Design: We recruited 10 subjects with MS at an early stage of the disease and 10 age-matched healthy control subjects. All subjects MS were recruited among those followed up as outpatients at AISM Rehabilitation Centre, Italian Multiple Sclerosis Society, Genova, Italy. The experimental protocol took place in a motion-analysis room, sound-attenuated, temperature-regulated, and illuminated with homogenous white light.

Setting: Subjects with MS followed up as outpatients at AISM Rehabilitation Centre, Genova, Italy.

Participants: 10 subjects with MS at an early stage of the disease and 10 age-matched healthy control subjects.

Interventions: Subjects had to perform 5 actions with upper limbs cyclical pointing movements among targets of different sizes; spatial precision of the pointing movements and kinematic analysis were measured. For the imagined trials, the subjects had to feel themselves performing the task.

Main Outcome Measures: Speed profile, reaction time, linear error measured with the motion analyzer system "SMART."

Results: During overt movements, healthy controls and subjects with MS modulated movement duration according to the size of targets, with a decreased speed in subjects with MS. This observation was also valid for the covert performance.

Conclusions: This result suggests a decline of mental prediction of motor actions in subjects with MS at an early stage of the disease and further suggests that motor imagery practice may be effective in enhancing motor performance in patients with MS.

Poster 264

Efficacy of Cycle Ergometer Rehabilitation Treatments in Subjects With Ambulatory Multiple Sclerosis: A Pilot Study.

Giampaolo Brichetto, MD, PhD (Italian Multiple Sclerosis Society, Genova, Italy); Mario Alberto A. Battaglia, Laura Lopes de Carvalho, Sara Rinaldi.

Disclosures: G. Brichetto, none.

Objective: People with multiple sclerosis (MS) tend to be less physically active than the general population even when their MS has caused minimal disability. One of the most frequently reported symptoms is primary fatigue. Randomized controlled trials have demonstrated that aerobic exercise training can improve fatigue and endurance in subjects with MS. The aim of our study was to evaluate