Platform presentations — accepted abstracts — AAOMPT 2010

PL-01

Changes in expectation following application of intervention: results of a secondary analysis

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Background: Investigations involving the influence of patient expectations on clinical outcomes are gaining popularity in the literature.

Purpose: Our purpose was to determine if: (1) expectations about an intervention change after the intervention has been applied; (2) expectations are associated with pain intensity ratings; and (3) expectations are somatospecific.

Methods: Ninety healthy volunteers were randomized to thoracic spinal manipulation (SMT), cranio-cervical flexion exercise (CCF), or no intervention (control), and then provided with a picture of the intervention. Their expectations of change in thermal pain intensity ratings (QST) at the calf following application of the intervention were measured. Pain responses at 47 and 49°C on the forearm and calf were tested using QST. The intervention was then applied. After the intervention, expectations of change in pain intensity ratings at the calf were measured again and immediately followed by QST. Expectations were analyzed using chi-squares. Thermal pain intensity was analyzed with three-way ANOVA. We were interested in interaction effects that included expectation.

Results: Pre-intervention expectations did not differ among groups ($P>0.05$); however, post-intervention expectations did with SMT ($P<0.01$) and CCF ($P<0.05$) groups more positive than control. Significant time–expectation interactions occurred for 47 or 49°C in the leg ($P=0.034$ and $P=0.006$), but not the forearm ($P>0.05$ for both).

Discussion: The results indicate that expectations regarding an intervention do change following intervention. Moreover, changes in expectation were associated with changes in responses to painful stimuli in the specific anatomical region to which expectation was directed.

PL-02

ECHOWS: development of a physical therapist assessment instrument for competence in patient history-taking

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Purpose: To develop a patient history-taking physical therapist assessment tool reflecting communication competence and comprehensiveness. Multiple medical school patient-interviewing tools exist; none are specific to orthopedic physical therapist (PT) practice. Instrument reliability and validity were assessed.

Description: Literature review on history taking, expert clinical practice and medical-based interviewing assessment instruments served as basis for the ECHOWS tool [E (establishing rapport), C (chief complaint), H (health history), O (obtain psychosocial perspective), W (wrap-up), and S (summary of performance)]. Content validity was established using five content experts (including residency/fellowship faculty). The panel reviewed ECHOWS twice leading to final revision and creation of a user ‘Guide’. Statistical analysis revealed good reliability and adequate construct validity.

Summary of use: Literature review determined the ECHOWS tool to be the first physical therapy-specific tool of its kind to assess competence in patient history-taking. ECHOWS and the user Guide may provide PT residency, fellowship and entry-level faculty with strategies to teach outpatient interviewing skills. It will serve as a tool for faculty and mentor assessment of residents, fellows, and students in patient history-taking, as well as for student/resident/fellow self-assessment. The tool is likely applicable for use in establishing competency in this critical patient-care skill. The tool can be utilized with live patient, videotaped patient, or simulated patient interactions.

PL-03

Clinical factors leading to physical therapists referring patients to physicians: a systematic review paper

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Background and purpose: Systematic review of patient case reports summarized physical therapist (PT) decision-making leading to patient referral with resultant diagnosis of disease. Findings provide insight regarding: patient access to therapy, examination findings associated with occult disease, examination elements most relevant to patient referral, and at which visit were patients referred.

Methods: Searches identified 64 case reports describing PT referral of patients with subsequent diagnosis of disease. Two reviewers using data extraction forms summarized patient access to therapy, relevant examination findings, timing of patient referral, and resultant diagnoses. A third reviewer resolved data extraction discrepancies.

Results: Forty-eight patients accessed services via physician referral and 16 via direct access. Common referral sources were primary care physicians (19) and orthopedists (11). Resultant diagnoses included musculoskeletal disorders ($n=38$), and visceral disorders (14). Chief presenting patient complaints included pain (49), weakness (4), or numbness (2), or a combination (9). In 47 cases, patient referrals occurred at initial visits. Fifty-two referrals were related to chief complaint concerns: examination findings inconsistent with prior diagnosis, recent worsening without cause, unusual accompanying symptoms (fatigue, weakness), and inadequate response to treatment.

Discussion–conclusions: The systematic review revealed PT performing screening examinations regardless of patient access to services. As per established practice guidelines, comprehensive patient history and physical examination, with close monitoring of response to treatment, can lead to timely patient referral. Patient complaints common in PT practices (pain) can be associated with multiple disorders. PT screening beyond chief complaints was illustrated by 20% of referrals occurring for other concerns.

PL-04

Short-term response to hip mobilizations in individuals with chronic low back pain: a case series

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Background and purpose: The direct influence of the hip joints in patients with reports of low back pain

(LBP) is unclear. It has been postulated that impairments in the hip may contribute to LBP. The purpose of this case series was to investigate the short-term outcomes in patients with chronic LBP treated with manual therapy and exercise directed at the hip joints.

Methods: Eight consecutive patients (mean age: 43.9 years) with a primary report of chronic LBP (>6 months) without radiculopathy were treated with a standardized approach of manual physical therapy and exercise directed at the hips for a total of three sessions over approximately 1 week. At initial evaluation all patients completed a numeric rating pain scale (NPRS), Oswestry disability index (ODI), fear avoidance beliefs questionnaire (FABQ), and patient-specific functional scale (PSFS). Each patient completed all outcome measures in addition to the global rating of change (GROC) at the second and third treatment sessions.

Results: Five of the eight (62.5%) patients reported a +4 or better on the GROC at the third session, indicating a moderate improvement in self-reported symptoms. These individuals also experienced a 24.4% reduction in ODI scores.

Discussion–conclusion: This case series suggests that treating the hips may lead to improvements in disability in patients with chronic LBP. A larger trial is needed to determine if there is a possible subgroup of patients with chronic LBP that may respond to hip mobilizations.

PL-05

A clinical prediction rule for diagnosis of cervical spine myelopathy

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Background and purpose: Cervical spine myelopathy (CSM) is a clinical diagnosis made with appropriate imaging confirmation. At present, most clinical tests used to identify CSM are specific, and at present no clusters of clinical tests have proven more beneficial than stand-alone tests in guiding treatment decision making. This study endeavored to produce a cluster of predictive clinical findings for a sample of patients using a clinical diagnosis/imaging confirmation as the reference standard for CSM.

Methods: This case-based case-control design used data from 249 patients with various cervical spine dysfunctions and analyzed which clinical tests and measures, when clustered together, were most diagnostic for CSM. Using multivariate regression

analyses and calculations for sensitivity, specificity, and positive (LR+) and negative likelihood ratios (LR-), a definitive cluster was identified. Thirteen clinical findings were investigated for capacity to diagnosis CSM.

Results: Five clinical: (1) gait deviation; (2) +Hoffmann's test; (3) inverted supinator sign; (4) +Babinski test; and (5) age >45 years, demonstrated the capacity when clustered into one of five positive tests to rule out CSM (LR- = 0.18; 95% CI: 0.12–0.42), and when clustered into three of five positive findings to rule in CSM (LR+ = 30.9; 95% CI: 5.5–181.8).

Discussion–conclusion: This study found clustered combinations of clinical findings that could rule in and rule out CSM. These clusters may be useful in identifying patients with this complex diagnosis in similar patient populations.

PL-06

Sensitization of nociceptive responses is maintained in individuals following anterior cruciate ligament rupture

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Background and purpose: Anterior cruciate ligament (ACL) rupture often leads to altered muscle activation at the knee and decreased function. Hyperexcitability of nociceptive pathways has been demonstrated in many chronic musculoskeletal conditions but has not been investigated following ACL injury. The purpose of the study was to investigate potential increases in flexor withdrawal reflex (FWR) excitability in subjects with ACL rupture and to determine if painless stretch of knee joint structures enhances reflexive responses.

Description: Ten subjects with and 10 subjects without unilateral ACL rupture were compared. Symmetry of weightbearing was observed. FWRs were induced through electrocutaneous stimuli of the sural nerve at the ankle in symmetrical stance and recumbent positions. In recumbent position, the FWR was investigated with the knee in relaxed and stressed condition.

Outcomes: ACL-deficient subjects demonstrated decreased weightbearing on the injured limb ($P=0.02$). FWR thresholds were significantly diminished ($P=0.05$) on the ACL injured (11.8 ± 8 mA) compared to non-injured limb (18.6 ± 13 mA) and controls (22.5 ± 3 mA). Painless anterior tibial translation resulted in significant increase ($P=0.001$) in amplitude of EMG hamstring response in the ACL-deficient limb and significantly decreased latency ($P=0.01$) of hamstring activation (82.0 ± 13 ms).

Discussion–conclusions: Individuals with ACL rupture demonstrated increased excitability of FWR responses indicated by decreased FWR threshold and reduced hamstring muscle latency. Hyperexcitable nociceptive pathways may trigger flexor reflexes more promptly, producing the sensation of instability and 'giving way.' Manual therapy may function to dampen nociceptive excitability and may be indicated early post-joint injury.

PL-07

Association of thoracic outlet syndrome provocation tests and first rib dysfunction in subjects with carpal tunnel syndrome

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Background: Carpal tunnel syndrome (CTS) is the most common nerve entrapment neuropathy, yet a limited amount of research has investigated the potential relationship between CTS and dysfunction in the thoracic outlet.

Purpose: To compare the prevalence of positive clinical tests suggestive of neurogenic thoracic outlet syndrome (TOS) in subjects with CTS (CTS+) to subjects without CTS (control).

Methods: Subjects with electrodiagnostically confirmed CTS (CTS+) were recruited consecutively and matched to age (± 2 years) and gender with asymptomatic (control) subjects. All subjects underwent clinical testing for neurogenic TOS using the modified Cyriax release test, and the elevated arm stress test (EAST), and one test for the presence of an elevated first rib: the cervical rotation lateral flexion test (CRLF). The Fisher's exact test was used to determine frequency count significance.

Results: Of the 96 subjects recruited, 24 women and 8 men (mean age: 43.5 ± 5.9 years) in each group met inclusion criteria. A significantly greater number of CTS+ subjects presented with positive provocative testing for TOS (modified Cyriax release test $P=0.005$; EAST approached significance $P=0.027$) and for the presence of an elevated first rib (CRLF test $P=0.003$) as compared to controls. The likelihood of an elevated first rib was 16 times greater in the CTS+ group as compared to the control group.

Discussion–conclusion: A significantly greater number of subjects with CTS presented with symptoms associated with proximal dysfunctions suggestive of TOS. Evaluation of proximal structures and first rib in persons with CTS has clinical merit.

PL-08

Examination of clinician perceptions following continuing education on treatment-based classification for cervical pain

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Background and purpose: Research has demonstrated that a 2-day (8 hours) of continuing education is insufficient in changing clinician behavior and patient outcomes in the treatment of neck pain. The present report demonstrates clinicians' perceived benefit of an 8-hour continuing education session for the treatment of patients with neck complaints utilizing a manual therapy approach organized within the treatment-based classification system proposed by Childs *et al.* (2004).

Description: The course included evidence-based examination techniques along with heavy emphasis on cervical non-thrust mobilization and thoracic thrust manipulations. The course included a primer on evidence-based terminology and statistics. Thirteen physical therapists took part in the seminar. Clinicians had a median of 18 years (range: 0–33 years) experience and worked primarily in outpatient practices. One clinician held OCS recognition, while none held AAOMPT fellowship. Clinician beliefs on management of patients with neck pain were measured pre- and post-course using 11-point Likert scales (range: 0–10). Participant survey information demonstrated the greatest impact on familiarity with the treatment-based classification system (mean change: 3.0 ± 1.38 points), confidence in utilization of thrust manipulation for the thoracic spine and rib cage (mean change: 2.9 ± 1.35 points), and comfort with assessing the diagnostic accuracy of examination techniques (mean change: 2.9 ± 0.77 points).

Summary of use: Our results suggest that continuing education may positively impact clinicians' confidence and beliefs. More research should be devoted to further investigation on the impact of various types of continuing education courses on physical therapist confidence, knowledge, and beliefs as well as on patient outcomes.

PL-09

Diagnostic accuracy of patient history, demographic, observational, and clinical test findings in patients with lumbar spondylolisthesis

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Background and purpose: Degenerative and acquired spondylolisthesis is one of the most common lumbar diagnoses for younger, active individuals. Despite the commonality of the diagnosis, few studies have associated patient history, demographic/observational, and clinical test findings with the condition, which facilitates the expenses of radiographs as a screening tool. The purpose of this study was to determine whether single or clustered findings of patient history, demographic/observational, or clinical test findings were diagnostic of lumbar isthmic or acquired spondylolisthesis.

Methods: This study involved 861 consecutive patients evaluated at an adult spine surgery setting from 2006 to 2009. All patients received a standardized examination and radiographic imaging (lateral, anterior, and posterior views) and a confirmatory diagnosis (ICD-9 codes: 738.4 or 756.12) was based primarily on lateral radiographic views. We selected the associative variables of age, chronicity of symptoms, reflex findings (Achilles, quadriceps, tibialis posterior), painful positions and pain relieving positions, pain location, pain description, gait deviation, and injury mechanism. A logistic regression analysis was run and three variables (pain location, gait, and age) were retained after demonstrating *a priori* defined associations ($P \leq 0.15$). Receiver operating curves were used to identify the cut point for age (45 years).

Results: After input of a series of three 2×2 tables and calculating the diagnostic accuracy of each variable, none of the three yielded positive likelihood ratios greater than 1.3 or negative likelihood ratios below 0.41.

Discussion–conclusion: This study suggests that there is little value in the patient history, demographic/observation, and targeted clinical findings in the diagnosis of lumbar spondylolisthesis.

PL-10

Influence of hip rotation on mechanical thoracolumbar pain for a recreational golfer: a case report

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Purpose: This study investigates the importance of hip rotation mobility (HRM) to manage mechanical thoracolumbar (TL) pain and utilization of regional interdependence (RI) approach.

Subjects: A 58-year-old male recreational golfer presented with mechanical thoracolumbar pain after

playing golf. Observation and examination revealed C-posture, tenderness on right longissimus thoracis, positive joint provocation on TL region, and decreased HRM. Specific golf swing analysis found swing faults: over-the-top, sway, and slide.

Methods: Primary outcome measures are a change of internal HRM, numeric pain rating scale (NPRS), global rating of change scale (GROC), and patient-specific functional scale (PSFS). Secondary outcome compared a change of comparable signs and swing faults. Patient attended four treatment sessions managed by hip joint mobilization, TL region manipulation, and specific motor control and swing correction exercises.

Results: Initial to final score changes at discharge are 15–45° (right internal HRM), 25–46° (left internal HRM), 4–0 out of 10 (NPRS), and 0–10 (PSFS). GROC score was +7 at discharge and 4-week follow-up. Improvement of golf swing was observed with neutral trunk stance, decreased deviation of over-the-top, sway, and slide. Especially, patient demonstrated efficient motor control for the pelvic to hip relationship during swing.

Discussion–conclusion: This study highlights the clinical importance of HRM relationship and RI to manage mechanical TL pain even though no cause and effect association can be drawn from a case. Further investigation with large study is warranted to assess this relationship for a golfer with mechanical TL or low back pain.

PL-11

Efficacy of orthopaedic manual physical therapy and exercise in the treatment of cervicogenic headache with concurrent headache types: a pilot study

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Background and purpose: Cervicogenic headache is a common condition and recent studies have shown that multimodal treatment, consisting of orthopaedic manual physical therapy (OMPT) and exercise, can reduce the symptoms of cervicogenic headache. No study has investigated the effect of multimodal treatment on cervicogenic headache with concurrent headache types.

Methods: Seven consecutive patients who met the diagnostic criteria for cervicogenic headache were diagnosed and assigned to appropriate groups: cervicogenic headache only ($n=3$) and cervicogenic headache and a concurrent headache type ($n=4$). Two non-equivalent groups that were formed received the same multimodal treatment: OMPT and exercise. The primary outcome was change in

headache frequency, while change in headache intensity and duration served as secondary outcomes as measured by a headache diary. Physical outcomes included neck flexor muscle performance, cervical active range of motion, and upper cervical joint dysfunction.

Results: The group as a whole demonstrated a significant improvement over time after receiving OMPT interventions and exercise for headache frequency, intensity and duration, neck disability, and muscle performance. The only difference between the groups was change in headache frequency as the cervicogenic headache with concurrent headache group had a greater reduction in headache frequency. There was a difference in neck disability at baseline between groups with the multiple headache group showing less disability.

Discussion–conclusion: The results of our study are encouraging for the clinical use of orthopaedic manual physical therapy and exercise for patients with cervicogenic headache with and without concurrent headache.

PL-12

Students' perceptions of practicing joint manipulation during clinical education: identification of barriers

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Background and purpose: Thrust joint manipulation (TJM) is an entry level skill with significant research evidence supporting its use. It is therefore imperative that students are allowed to practice and refine this skill in the clinic. This study attempted to identify student perceived barriers to utilizing TJM during clinical internships.

Methods: Students from all PT programs were targeted via email in their final year of graduation and within 3 months following graduation. Surveys were sent to program directors who were asked to distribute to students.

Results: Four hundred and sixty students responded from 38 states including all US regions: 94.8% of respondents received academic training in TJM; 54.2% of the respondents cited clinical instructor (CI) comfort level as a barrier to practicing TJM on patients, including CI's belief that TJM was not an entry level skill, concerns about liability, and limited availability of trained staff to supervise TJM. When students were allowed to utilize TJM, many did not due to lack of confidence (54.5%), personal skill level (47.5%), and not feeling prepared academically (25.8%). Respondents lacked confidence in TJM of

the cervical spine, and were most comfortable with techniques for the thoracolumbar spine and pelvis.

Discussion–conclusions: In comparison to earlier studies, there appears to be an increase in TJM instruction at the didactic level; however, one in four students does not feel academically prepared to utilize TJM. Barriers to the use of TJM also exist in the clinic, and further research is warranted to determine ways to overcome these barriers.

PL-13

Examination of the sidebending and rotation stress tests for alar ligament integrity using magnetic resonance imaging

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Background: Alar ligaments are integral to cervical spine stability, limiting occipito-atlanto-axial rotation and lateral flexion. Given the lack of validation of tests for alar ligament integrity and possible serious consequences for patients treated with manipulative techniques if upper cervical instability remains undetected, steps to validate the tests are imperative. This study examines the sidebending and rotation stress tests described for the alar ligaments in normal volunteers using magnetic resonance imaging (MRI).

Methods: MRI was performed in supine in neutral and end-range stress test positions using proton density-weighted sequences and a standard head coil in a 3-T system. Measurements were made following a standardised protocol relative to position of the axis. Distances were measured from dens tip to inferior margin of foramen magnum and from midsubstance of the dental attachment of the ligament to its occipital insertion. Between-side differences were calculated for each measurement to account for inherent asymmetries in morphology. Differences were compared between the stress test and neutral positions using a Wilcoxon signed-rank test.

Results: Sixteen people between ages of 19 and 38 years participated. Sidebending stress tests produced a mean between side difference in ligament length of +1.67 mm ($P<0.01$) indicating increased measurement of the contralateral ligament. Rotation stress testing produced a mean between side difference in ligament length of +1.47 mm ($P<0.01$) indicating increased measurement contralaterally.

Conclusions: Both the sidebending and rotation stress tests produce a consistent increase in measured

length of the contralateral alar ligament. This is in accord with the mechanisms proposed for their use in clinical practice.

PL-14

Postural control in older adults with subclinical neck impairments: a pilot study

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Background and purpose: Connections between the upper cervical region, vestibular system, and the cerebellum have been demonstrated in animals, but not in humans. The purpose of this study was to investigate the relationship between active neck range of motion (ROM) and postural control in community dwelling older adults with no history of neck pain or pathology.

Methods: Sixteen healthy community dwelling older adults (mean age: 73 ± 7.3 years; 62.5% men) were recruited. Kinematic analysis was performed using a motion capture system with 17 markers to measure neck ROM. The clinical balance measures were Berg balance scale, timed 'up and go' (TUG), and functional gait assessment (FGA). Dynamic posturography was performed using the NeuroCom[®] force-plate which rotated in response to center-of-pressure movements. Posturography tests were performed using three blocks of seven randomized trials.

Results: Spearman correlation coefficient revealed significant moderate to strong correlations between upper cervical rotation limitations and the various clinical balance measures (TUG: $r = -0.54$, $P < 0.05$; FGA: $r = 0.67$, $P < 0.01$). Berg balance scores, TUG, and FGA performance were poorer (6.4, 20.9 and 22.4%, respectively) in older adults with cervical rotation ROM limitations (total range $< 70^\circ$) than in those without ROM limitations (P for ANOVA < 0.05). Older adults with upper and lower cervical ROM limitations also showed significantly greater rotational and translational sway, respectively.

Discussion–conclusions: Subclinical impairments in neck mobility are associated with increased sway and impaired balance. Potentially modifiable cervical ROM and intersegmental mobility impairments may be possible sources of balance dysfunction and fall risk in older adults.

PL-15

Randomized trial assessing patient responses to therapeutic exercise based on a clinical prediction rule for spinal manipulation

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Background: A clinical prediction rule (CPR) can be used to enhance decision-making with back pain care using spinal thrust manipulation (STM). However, using individualized therapeutic exercise (mechanical diagnosis and therapy, MDT) may be as effective in patients meeting the CPR selection criteria.

Purpose: To determine in patients meeting the CPR for STM would demonstrate similar outcome with MDT.

Methods: Following initial examination, 31 consenting patients (19 females and 12 males; range: 23–60 years) who met CPR selection criteria (symptoms proximal to knee, <16 days, hip internal rotation >35°, one lumbar segment hypomobile, FABQw<19) were randomly assigned to receive STM ($n=12$) or MDT ($n=19$) treatment. The Oswestry disability questionnaire (OSW) and the

numerical pain rating scale (NPRS) were administered initially, at discharge, and 6-month follow-up. Subject crossover from one treatment to another was allowed after 2 weeks if symptoms failed to improve. All four subjects who met criteria for crossover went from STM to MDT.

Results: Data were analyzed for changes in OSW and NPRS scores from initial examination through 6 months. Results indicated more favorable reduction in pain response with MDT in patients who met the CPR for STM ($P=0.018$) at discharge, but reported more similarly at 6 months ($P=0.06$), as limited by high attrition (MDT=5; STM=2).

Discussion–conclusions: Safety and effectiveness of STM or MDT treatment methods for low back pain have been established. All participants reported reduction in pain and disability due to their back pain; however, results suggest that patients who meet the CPR for STM may also benefit from MDT.