PASIG PERFORMING ARTS
SPECIAL INTEREST GROUP

ORTHOPAEDIC SECTION
AMERICAN PHYSICAL THERAPY ASSOCIATION

APTA
American Physical Therapy Association
The Science of Healing. The Art of Caring.

PASIG MONTHLY CITATION BLAST: No.72 **June 2012**

Dear Performing Arts SIG members:

Summer is here! This is the season of change among performers, many of whom have just finished their last performance and have signed new contracts. Likewise, collegiate and pre-professional performing artists are on break, getting ready for the summer intensives. The transitional month of June is a great time to read up on current best evidence, and work on research abstract submissions to next year's conferences. This month's citation blast is on "Neck Pain in the Performing Artist."

This compilation includes cervicothoracic-themed abstracts on dancers, musicians, and vocalists. In addition to current research with levels of evidence spanning case reports to systematic reviews on evaluation and treatment of neck pain, primers on how to evaluate research papers are included.

Discussion of clinical prediction rules among clinicians and academicians has been animated this year, as we strive together to advance our profession. As practitioners caring for performing artists, we have the unique opportunity to collaborate with researchers, clinicians, and patients who would benefit from our insight. There is certainly a need for more peer-reviewed publications on orthopaedic research in the performing arts population. Kudos to the authors of the few performing artist-centered articles included in this citation blast. Our hope is that these citation blasts provide impetus to action, and that you will contribute your case study, participate in research, and practice excellence.

The format is an annotated bibliography of articles generally from the last decade. The PASIG Research Committee initiated this monthly Citation BLAST on performing arts-related topics in June 2005 in the hopes of encouraging our members to stay current in the literature and, perhaps, consider conducting research themselves. Each month we send a new list of performing arts (PA) citations to members of the PASIG to further the pursuit of PA-related scholarship. (Information about EndNote referencing software can be found at http://www.endnote.com, including a 30-day free trial).

Please consider compiling and contributing a brief summary of Performing Arts-related abstracts for citation blast this year. It's easy to do, and a great way to become involved with PASIG!

Warm regards,

Annette

Annette Karim, PT, DPT, OCS
Chair, PASIG Research Committee
Home: neoluvsonlyme@aol.com Work: akarim@evergreenpt.net

PASIG Research Committee members:
Shaw Bronner PT, PhD, OCS, sbronner@liu.edu
Jeff Stenback PT, OCS, jsptocs2@hotmail.com
Sheyi Ojofeitimi PT, DPT, sojofeit@gmail.com
Jennifer Gamboa PT, DPT, OCS, jgamboa@bodydynamicsinc.com
Susan D. Fain PT, DMA, sfain@ptcentral.org

Monthly Citation Blast EndNote Assistant:
Laura Reising, MS, SPT lbr2120@columbia.edu

PERFORMING ARTS CONTINUING EDUCATION AND CONFERENCES

Orthopaedic Section Independent Study Course. *20.3 Physical Therapy for the Performing Artist.*
Monographs are available for:
- Figure Skating (J. Flug, J. Schneider, E. Greenberg),
- Artistic Gymnastics (A. Hunter-Giordano, Pongetti-Angeletti, S. Voelker, TJ Manal), and
- Instrumentalist Musicians (J. Dommerholt, B. Collier).

Contact: Orthopaedic Section at: www.orthopt.org

Orthopaedic Section Independent Study Course. *Dance Medicine: Strategies for the Prevention and Care of Injuries to Dancers*.

This is a 6-monograph course and includes many PASIG members as authors.
- Epidemiology of Dance Injuries: Biopsychosocial Considerations in the Management of Dancer Health (MJ Liederbach),
- Nutrition, Hydration, Metabolism, and Thinness (B Glace),
- The Dancer's Hip: Anatomic, Biomechanical, and Rehabilitation Considerations (G. Grossman),
- Common Knee Injuries in Dance (MJ Liederbach),
- Foot and Ankle Injuries in the Dancer: Examination and Treatment Strategies (M. Molnar, R. Bernstein, M. Hartog, L. Henry, M. Rodriguez, J. Smith, A. Zujko),
- Developing Expert Physical Therapy Practice in Dance Medicine (J. Gamboa, S. Bronner, TJ Manal).

Contact: Orthopaedic Section at: www.orthopt.org

Westside Dance Physical Therapy, Dance Medicine Practicum. Module IV: Thorax, Cervical Spine and Shoulder Girdle, June 1st-3rd, 2012.
http://westsidedancept.com/education/dance-medicine-practicum/

Harkness Center for Dance Injuries, Hospital for Joint Diseases. Principles of Dance Medicine: Clinical management of the dancer patient. New York, NY, July 12 – 15, 2012. http://hjd.med.nyu.edu/harkness/education/healthcare-professionals/upcoming-educational-courses

Dance USA 2012 Annual Conference. San Francisco, CA. June 27-30, 2012.
http://conference.danceusa.org/

Performing Arts Medical Association (PAMA). 30th Annual Symposium: Medical Problems of Performing Artists, Snowmass, CO, July 26 – 29, 2012. Contact: http://www.artsmed.org

International Association for Dance Medicine and Science: 22nd Annual Meeting, Singapore. October 25 – 28, 2012. Contact: http://www.iadms.org

Do you have a new course or performing arts residency or fellowship? Email me!
neoluvsonlyme@aol.com Annette Karim, PT, DPT, OCS

Neck Pain in the Performing Artist

“Muscle tension” “Facet dysfunction” “Herniated disc” “Rib dysfunction” “Postural syndrome” “Whiplash” “Cervical Radiculopathy” “Stenosis” “Myelopathy”

A performing artist with neck pain from evokes various initial thoughts in clinicians. Thoughts then move forward to tests. Do we always, sometimes, or never test for vertebral artery insufficiency, ligamentous instability, and presence of red flags? Do we use clinical prediction rules? How do we know these rules are valid and reliable? Do we rule out before we rule in? Do we use too many or too few tests?

“Massage” “Manipulation” “Mobilization” “Root cause” “Tape” “Stretch” “Hot pack” “Movement re-education” “Exercise” “Stabilization” “Craniosacral” “Trigger Points”

Do we respond as evidence-based practitioners in our evaluation, assessment, treatment, and plan of care? Do we consider best evidence, clinician expertise, and patient values? Do we read abstracts or full research articles? *How* do we read abstracts and articles? The flowing citations and abstracts were compiled to help us consider the evidence alongside experience, and acknowledge differences between the improvisational painter, the violinist, the aerial dancer, and the B-boy.

Annette Karim, PT, DPT, OCS
Director of Dance Medicine
Evergreen Physical Therapy Specialists

Asavasopon, S., J. Jankoski, et al. (2005). "Clinical diagnosis of vertebrobasilar insufficiency: resident's case problem." J Orthop Sports Phys Ther **35**(10): 645-650.

STUDY DESIGN: Resident's case problem. BACKGROUND: Vertigo and visual disturbances are common symptoms associated with vertebrobasilar insufficiency (VBI), but the physical examination procedures to verify the existence of VBI have not been validated in the literature. The objective of this resident's case problem is to demonstrate how a patient's complaint of vertigo and visual disturbances, combined with positive clinical examination findings, can be a potential medical screening tool for VBI. DIAGNOSIS: The patient in this report was initially referred to physical therapy for neck pain. However, the patient's chief concerns identified during the history were (1) vertigo, (2) visual disturbances, (3) headache, and (4) right shoulder region pain. Clinical VBI tests were performed, whereby the patient's vertigo and visual disturbances were reproduced with cervical spine extension. The patient was sent back to the referring physician to be evaluated for possible VBI. Diagnostic imaging tests were ordered. Carotid ultrasound revealed 80% to

90% stenosis in the proximal left internal carotid artery, and magnetic resonance angiography of the extracerebral vessels showed greater than 90% stenosis of the left internal carotid artery. DISCUSSION: VBI may be present in patients with subjective reports of vertigo and visual disturbances that are reproduced with VBI physical examination procedures.

Borody, C. (2004). "Neck-tongue syndrome." J Manipulative Physiol Ther **27**(5): e8.
OBJECTIVE: To discuss a case of neck-tongue syndrome (NTS) affecting a dancer/figure skater, review literature summarizing the pathogenesis and treatment, and offer new categorization of neck-tongue syndrome. CLINICAL FEATURES: A 24-year-old female dancer/skater sought treatment for recurrent episodes of right-sided upper neck pain with associated ipsilateral numbness of her tongue following brisk active rotation. Radiographs revealed a narrowing of the left para-odontoid space. Physical examination revealed a mildly painful restriction in rotation at C1-2 with no apparent muscular hypertonicity. INTERVENTION AND OUTCOME: The patient had sought chiropractic treatment for this condition several times since she was 8 years old. Diversified chiropractic adjustments were applied to restrictions throughout the cervical spine as determined by the clinician. No other interventions were employed. The patient experienced significant improvement in frequency and intensity of the neck and tongue symptoms following spinal manipulative therapy applied to her cervical spine. CONCLUSIONS: There are 2 categories of NTS: complicated NTS due to the presence of an underlying disease process (inflammatory or degenerative) and uncomplicated NTS (idiopathic or trauma-related). This case report is of uncomplicated NTS that responded favorably to spinal manipulative therapy directed at the cervical spine. In the absence of upper cervical instability, spinal manipulative therapy appears to be beneficial and should be considered in all cases of uncomplicated NTS.

Boyles, R. E., M. J. Walker, et al. (2010). "The addition of cervical thrust manipulations to a manual physical therapy approach in patients treated for mechanical neck pain: a secondary analysis." J Orthop Sports Phys Ther **40**(3): 133-140.
STUDY DESIGN: Secondary analysis of a randomized clinical trial (RCT). OBJECTIVES: To perform a secondary analysis on the treatment arm of a larger RCT to determine differences in treatment outcomes, adverse reactions, and effect sizes between patients who received cervical thrust manipulation and those who received only nonthrust manipulation as part of an impairment-based, multimodal treatment program of manual physical therapy (MPT) and exercise for patients with mechanical neck pain. BACKGROUND: A treatment regimen of MPT and exercise has been effective in patients with mechanical neck pain. Limited research has compared the effectiveness of cervical thrust manipulations and nonthrust mobilizations for this patient population, and no studies have investigated the added benefit of cervical thrust manipulations as part of an overall MPT

treatment plan. METHODS: Treatment outcomes from 47 patients in the treatment arm of a larger RCT, with a primary complaint of mechanical neck pain, were analyzed. Twenty-three patients (49%) received cervical thrust manipulations as part of their MPT treatment, and 24 patients (51%) received only cervical nonthrust mobilizations. All patients received up to 6 clinic sessions, twice weekly for 3 weeks, and a home exercise program. Primary outcome measures were the Neck Disability Index (NDI), 2 visual analog scales for cervical and upper extremity pain, and a 15-point global rating of change scale. Blinded outcome measurements were collected at baseline and at 3-, 6- and 52-week follow-ups. RESULTS: Consistent with the larger RCT, both subgroups in this secondary analysis demonstrated improvement in short- and long-term pain and disability scores. Low statistical power (beta< or =.28) and the resultant small effect size indices (-0.21 to 0.17) preclude the identification of any between-group differences. No serious adverse reactions were reported by patients in either subgroup. CONCLUSIONS: Clinically meaningful and statistically significant improvements in both subgroups of patients over time suggest that cervical thrust manipulation, as part of the MPT treatment plan, did not influence the results of the treatment arm of the larger RCT from which this study was drawn. Although no between-group differences can be identified, the small observed effect sizes in this study may benefit future studies with sample size estimation for larger RCTs and indicate the need to incorporate clinical prediction rule criteria as a means to improve statistical power. LEVEL OF EVIDENCE: Therapy, level 4.

Brehaut, J. C., I. D. Graham, et al. (2010). "Measuring acceptability of clinical decision rules: validation of the Ottawa acceptability of decision rules instrument (OADRI) in four countries." Medical Decision Making **30**(3): 398-408.

BACKGROUND:
Clinical decision rules can benefit clinicians, patients, and health systems, but they involve considerable up-front development costs and must be acceptable to the target audience. No existing instrument measures the acceptability of a rule. The current study validated such an instrument. METHODS: The authors administered the Ottawa Acceptability of Decision Rules Instrument (OADRI) via postal survey to emergency physicians from 4 regions (Australasia, Canada, United Kingdom, and United States), in the context of 2 recently developed rules, the Canadian C-Spine Rule (C-Spine) and the Canadian CT Head Rule (CT-Head). Construct validity of the 12-item instrument was evaluated by hypothesis testing.RESULTS:As predicted by a priori hypotheses, OADRI scores were 1) higher among rule users than nonusers, 2) higher among those using the rule "all of the time" v. "most of the time" v. "some of the time," and 3) higher among rule nonusers who would consider using a rule v. those who would not. We also examined explicit reasons given by respondents who said they would not use these rules. Items in the OADRI accounted for 85.5% (C- Spine) and 90.2% (CT-Head) of the reasons given for not considering a rule acceptable. CONCLUSIONS:The OADRI is a simple, 12-item instrument that evaluates rule acceptability among clinicians.

Potential uses include comparing multiple "protorules" during development, examining acceptability of a rule to a new audience prior to implementation, indicating barriers to rule use addressable by knowledge translation interventions, and potentially serving as a proxy measure for future rule use.

Bronfort, G., M. Haas, et al. (2004). "Efficacy of spinal manipulation and mobilization for low back pain and neck pain: a systematic review and best evidence synthesis." Spine J **4**(3): 335-356.

BACKGROUND CONTEXT: Despite the many published randomized clinical trials (RCTs), a substantial number of reviews and several national clinical guidelines, much controversy still remains regarding the evidence for or against efficacy of spinal manipulation for low back pain and neck pain. PURPOSE: To reassess the efficacy of spinal manipulative therapy (SMT) and mobilization (MOB) for the management of low back pain (LBP) and neck pain (NP), with special attention to applying more stringent criteria for study admissibility into evidence and for isolating the effect of SMT and/or MOB. STUDY DESIGN: RCTs including 10 or more subjects per group receiving SMT or MOB and using patient-oriented primary outcome measures (eg, patient-rated pain, disability, global improvement and recovery time). METHODS: Articles in English, Danish, Swedish, Norwegian and Dutch reporting on randomized trials were identified by a comprehensive search of computerized and bibliographic literature databases up to the end of 2002. Two reviewers independently abstracted data and assessed study quality according to eight explicit criteria. A best evidence synthesis incorporating explicit, detailed information about outcome measures and interventions was used to evaluate treatment efficacy. The strength of evidence was assessed by a classification system that incorporated study validity and statistical significance of study results. Sixty-nine RCTs met the study selection criteria and were reviewed and assigned validity scores varying from 6 to 81 on a scale of 0 to 100. Forty-three RCTs met the admissibility criteria for evidence. RESULTS: Acute LBP: There is moderate evidence that SMT provides more short-term pain relief than MOB and detuned diathermy, and limited evidence of faster recovery than a commonly used physical therapy treatment strategy. Chronic LBP: There is moderate evidence that SMT has an effect similar to an efficacious prescription nonsteroidal anti-inflammatory drug, SMT/MOB is effective in the short term when compared with placebo and general practitioner care, and in the long term compared to physical therapy. There is limited to moderate evidence that SMT is better than physical therapy and home back exercise in both the short and long term. There is limited evidence that SMT is superior to sham SMT in the short term and superior to chemonucleolysis for disc herniation in the short term. However, there is also limited evidence that MOB is inferior to back exercise after disc herniation surgery. Mix of acute and chronic LBP: SMT/MOB provides either similar or better pain outcomes in the short and long term when compared with placebo and with other treatments, such as McKenzie therapy, medical care, management by physical therapists, soft tissue treatment and back school.

Acute NP: There are few studies, and the evidence is currently inconclusive. Chronic NP: There is moderate evidence that SMT/MOB is superior to general practitioner management for short-term pain reduction but that SMT offers at most similar pain relief to high-technology rehabilitative exercise in the short and long term. Mix of acute and chronic NP: The overall evidence is not clear. There is moderate evidence that MOB is superior to physical therapy and family physician care, and similar to SMT in both the short and long term. There is limited evidence that SMT, in both the short and long term, is inferior to physical therapy. CONCLUSIONS: Our data synthesis suggests that recommendations can be made with some confidence regarding the use of SMT and/or MOB as a viable option for the treatment of both low back pain and NP. There have been few high-quality trials distinguishing between acute and chronic patients, and most are limited to shorter-term follow-up. Future trials should examine well-defined subgroups of patients, further address the value of SMT and MOB for acute patients, establish optimal number of treatment visits and consider the cost-effectiveness of care.

Childs, J. D., J. A. Cleland, et al. (2008). "Neck pain: Clinical practice guidelines linked to the International Classification of Functioning, Disability, and Health from the Orthopedic Section of the American Physical Therapy Association." J Orthop Sports Phys Ther **38**(9): A1-A34.

The Orthopaedic Section of the American Physical Therapy Association presents this second set of clinical practice guidelines on neck pain, linked to the International Classification of Functioning, Disability, and Health (ICF). The purpose of these practice guidelines is to describe evidence-based orthopaedic physical therapy clinical practice and provide recommendations for (1) examination and diagnostic classification based on body functions and body structures, activity limitations, and participation restrictions, (2) prognosis, (3) interventions provided by physical therapists, and (4) assessment of outcome for common musculoskeletal disorders.

Childs, J. D., T. W. Flynn, et al. (2005). "Screening for vertebrobasilar insufficiency in patients with neck pain: manual therapy decision-making in the presence of uncertainty." J Orthop Sports Phys Ther **35**(5): 300-306.

Growing evidence supports the effectiveness of manual therapy interventions in patients with neck pain; however, considerable attention has also been afforded to the potential risks such as vertebrobasilar insufficiency (VBI). Despite the existence of guidelines advocating specific screening procedures, research does not support the ability to accurately identify patients at risk. The logical question becomes, "How does one proceed in the absence of certainty?" Given the lack of clear direction for decision making in the peer-reviewed literature, this commentary discusses the uncertainties that exist regarding the ability to identify patients at risk for VBI. The authors hope that this commentary adds additional perspective on manual therapy decision-making strategies in the presence of uncertainty.

Cleland, J. A., P. Glynn, et al. (2007). "Short-term effects of thrust versus nonthrust mobilization/manipulation directed at the thoracic spine in patients with neck pain: a randomized clinical trial." Phys Ther **87**(4): 431-440.

BACKGROUND AND PURPOSE: Evidence supports the use of manual physical therapy interventions directed at the thoracic spine in patients with neck pain. The purpose of this study was to compare the effectiveness of thoracic spine thrust mobilization/manipulation with that of nonthrust mobilization/manipulation in patients with a primary complaint of mechanical neck pain. The authors also sought to compare the frequencies, durations, and types of side effects between the groups. SUBJECTS: The subjects in this study were 60 patients who were 18 to 60 years of age and had a primary complaint of neck pain. METHODS: For all subjects, a standardized history and a physical examination were obtained. Self-report outcome measures included the Neck Disability Index (NDI), a pain diagram, the Numeric Pain Rating Scale (NPRS), and the Fear-Avoidance Beliefs Questionnaire. After the baseline evaluation, the subjects were randomly assigned to receive either thoracic spine thrust or nonthrust mobilization/manipulation. The subjects were reexamined 2 to 4 days after the initial examination, and they again completed the NDI and the NPRS, as well as the Global Rating of Change (GROC) Scale. The primary aim was examined with a 2-way repeated-measures analysis of variance (ANOVA), with intervention group (thrust versus nonthrust mobilization/manipulation) as the between-subjects variable and time (baseline and 48 hours) as the within-subject variable. Separate ANOVAs were performed for each dependent variable: disability (NDI) and pain (NPRS). For each ANOVA, the hypothesis of interest was the 2-way group x time interaction. RESULTS: Sixty patients with a mean age of 43.3 years (SD=12.7) (55% female) satisfied the eligibility criteria and agreed to participate in the study. Subjects who received thrust mobilization/manipulation experienced greater reductions in disability, with a between-group difference of 10% (95% confidence interval [CI]=5.3-14.7), and in pain, with a between-group difference of 2.0 (95% CI=1.4-2.7). Subjects in the thrust mobilization/manipulation group exhibited significantly higher scores on the GROC Scale at the time of follow-up. No differences in the frequencies, durations, and types of side effects existed between the groups. DISCUSSION AND CONCLUSION: The results suggest that thoracic spine thrust mobilization/manipulation results in significantly greater short-term reductions in pain and disability than does thoracic nonthrust mobilization/manipulation in people with neck pain.

Cleland, J. A., P. E. Mintken, et al. (2010). "Examination of a clinical prediction rule to identify patients with neck pain likely to benefit from thoracic spine thrust manipulation and a general cervical range of motion exercise: multi-center randomized clinical trial." Phys Ther **90**(9): 1239-1250.

BACKGROUND: A clinical prediction rule (CPR) purported to identify patients with neck pain who are likely to respond to thoracic spine thrust manipulation has recently been developed, but has yet to be validated. OBJECTIVE: The

purpose of this study was to examine the validity of this CPR. DESIGN: This was a multi-center randomized clinical trial. METHODS: One hundred forty patients with a primary report of neck pain were randomly assigned to receive either 5 sessions of stretching and strengthening exercise (exercise-only group) or 2 sessions of thoracic spine manipulation and cervical range of motion exercise followed by 3 sessions of stretching and strengthening exercise (manipulation + exercise group). Data on disability and pain were collected at baseline, 1 week, 4 weeks, and 6 months. The primary aim (treatment group x time x status on the prediction rule) was examined using a linear mixed model with repeated measures. Time, treatment group, and status on the rule, as well as all possible 2-way and 3-way interactions, were modeled as fixed effects, with disability (and pain) as the dependent variable. Effect sizes were calculated for both pain and disability at each follow-up period. RESULTS: There was no 3-way interaction for either disability or pain. A 2-way (group x time) interaction existed for both disability and pain. Pair-wise comparisons of disability demonstrated that significant differences existed at each follow-up period between the manipulation + exercise group and the exercise-only group. The patients who received manipulation exhibited lower pain scores at the 1-week follow-up period. The effect sizes were moderate for disability at each follow-up period and were moderate for pain at the 1-week follow-up. LIMITATIONS: Different exercise approaches may have resulted in a different outcome. CONCLUSIONS: The results of the current study did not support the validity of the previously developed CPR. However, the results demonstrated that patients with mechanical neck pain who received thoracic spine manipulation and exercise exhibited significantly greater improvements in disability at both the short- and long-term follow-up periods and in pain at the 1-week follow-up compared with patients who received exercise only.

Cleland, J. A., J. T. Noteboom, et al. (2008). "A primer on selected aspects of evidence-based practice relating to questions of treatment. Part 1: asking questions, finding evidence, and determining validity." J Orthop Sports Phys Ther **38**(8): 476-484.

The process of evidence-based practice (EBP) guides clinicians in the integration of individual clinical expertise, patient values and expectations, and the best available evidence. Becoming proficient with this process takes time and consistent practice, but should ultimately lead to improved patient outcomes. The EBP process entails 5 steps: (1) formulating an appropriate question, (2) performing an efficient literature search, (3) critically appraising the best available evidence, (4) applying the best evidence to clinical practice, and (5) assessing outcomes of care. This first commentary in a 2-part series will review principles relating to steps 1, 2, and 3 of this 5-step model. The purpose of this commentary is to provide a perspective to assist clinicians in formulating foreground questions, searching for the best available evidence, and determining validity of results in studies of interventions for orthopaedic and sports physical therapy.

Cross, K. M., C. Kuenze, et al. (2011). "Thoracic spine thrust manipulation improves pain, range of motion, and self-reported function in patients with mechanical neck pain: a systematic review." J Orthop Sports Phys Ther **41**(9): 633-642.

STUDY DESIGN: Systematic review. BACKGROUND: Neck pain is a common diagnosis in the physical therapy setting, yet there is no gold standard for treatment. This study is part of a growing body of literature on the use of thoracic spine thrust manipulation for the treatment of individuals with mechanical neck pain. OBJECTIVE: The purpose of this systematic review was to determine the effects of thoracic spine thrust manipulation on pain, range of motion, and self-reported function in patients with mechanical neck pain. METHODS: Six online databases were comprehensively searched from their respective inception to October 2010. The primary search terms included "thoracic mobilization," "thoracic spine mobilization," "thoracic manipulation," and "thoracic spine manipulation." Of the 44 studies assessed for inclusion, 6 randomized controlled trials were retained. Between-group mean differences and effect sizes for pretreatment-to-posttreatment change scores, using Cohen's d formula, were calculated for pain, range of motion, and subjective function at all stated time intervals. RESULTS: Effect size point estimates for the pain change scores were significant for global assessment across all studies (range, 0.38-4.03) but not conclusively significant at the end range of active rotation (range, 0.02-1.79). Effect size point estimates were large among all range-of-motion change measures (range, 1.40-3.52), and the effect size point estimates of the change scores among the functional questionnaires (range, 0.47-3.64) also indicated a significant treatment effect. CONCLUSIONS: Thoracic spine thrust manipulation may provide short-term improvement in patients with acute or subacute mechanical neck pain. However, the body of literature is weak, and these results may not be generalizable. LEVEL OF EVIDENCE: Therapy, level 1b-.

Damian, M. and C. Zalpour (2011). "Trigger point treatment with radial shock waves in musicians with nonspecific shoulder-neck pain: data from a special physio outpatient clinic for musicians." Med Probl Perform Art **26**(4): 211-217.

Musicians often suffer from disorders of the musculoskeletal system that are related to their instrument playing. Among the most frequent symptoms are complaints in the shoulder-neck area. Radial shock wave therapy is increasingly used in trigger point treatment, but only few high-level studies have examined of shock wave therapy used together with physical therapy in the treatment of musicians. METHODS: This randomized blinded study in musicians (n = 26) with nonspecific shoulder-neck problems was done to examine the effect of shock wave therapy in addition to current physical therapy on the symptoms and quality of life of the musicians as well as their habits of playing musical instruments (intervention group shock wave vs reference group placebo). The effects were documented by a pain VAS and other instruments. A questionnaire designed specifically for musicians (with initial and final questions) recorded intensity and manifestation of pain and handicaps in daily life, especially when practicing and playing. The Shoulder

Pain and Disability Index (SPADI) and the Neck Pain Disability Index Questionnaire (NPDIQ) were also used. RESULTS: Both groups reported subjective improvement in pain, but significance was found only for the intervention group for the SPADI and NPDIQ. CONCLUSIONS: Trigger point treatment with radial shock wave used in combination with physical therapy makes the subjects feel temporarily relieved of neck and shoulder pains. The effects of radial shock wave without physical therapy will need to be examined in further studies.

Duane, T. M., S. P. Wilson, et al. (2011). "Canadian Cervical Spine rule compared with computed tomography: a prospective analysis." J Trauma **71**(2): 352-355; discussion 355-357.

BACKGROUND: The Canadian cervical spine rule (CCS) has been found to be an effective tool to determine the need for radiographic evaluation of the cervical spine (c-spine) incorporating both clinical findings and mechanism. Previously, it has been validated only through clinical follow-up or selective use of X-rays. The purpose of this study was to validate it using computed tomography (CT) as the gold standard to identify fractures. METHODS: Prospective evaluation was performed on 3,201 blunt trauma patients who were screened by CCS and were compared with a complete c-spine CT. CSS positive indicated at least one positive clinical or mechanism finding, whereas CT positive indicated presence of a fracture. RESULTS: There were 192 patients with c-spine fractures versus 3,009 without fracture on CT. The fracture group was older (42.7 ± 19.0 years vs. 37.8 ± 17.5 years, p = 0.0006), had a lower Glasgow Coma Scale score (13.8 ± 4.2 vs. 14.4 ± 4.3, p < 0.0001), and lower systolic blood pressure (133.3 ± 23.8 mm Hg vs. 139.5 ± 23.1 mm Hg, p = 0.0023). The sensitivity of CCS was 100% (192/192), specificity was 0.60% (18/3009), positive predictive value was 6.03% (192/3183), and negative predictive value was 100% (18/18). Logistic regression identified only 8 of the 19 factors included in the CCS to be independent predictors of c-spine fracture. CONCLUSIONS: CCS is very sensitive but not very specific to determine the need for radiographic evaluation after blunt trauma. Based on this study, the rule should be streamlined to improve specificity while maintaining sensitivity.

Dunning, J. R., J. A. Cleland, et al. (2012). "Upper cervical and upper thoracic thrust manipulation versus nonthrust mobilization in patients with mechanical neck pain: a multicenter randomized clinical trial." J Orthop Sports Phys Ther **42**(1): 5-18.

STUDY DESIGN: Randomized clinical trial. OBJECTIVE: To compare the short-term effects of upper cervical and upper thoracic high-velocity low-amplitude (HVLA) thrust manipulation to nonthrust mobilization in patients with neck pain. BACKGROUND: Although upper cervical and upper thoracic HVLA thrust manipulation and nonthrust mobilization are common interventions for the management of neck pain, no studies have directly compared the effects of both upper cervical and upper thoracic HVLA thrust manipulation to nonthrust mobilization in patients with neck pain. METHODS:

Patients completed the Neck Disability Index, the numeric pain rating scale, the flexion-rotation test for measurement of C1-2 passive rotation range of motion, and the craniocervical flexion test for measurement of deep cervical flexor motor performance. Following the baseline evaluation, patients were randomized to receive either HVLA thrust manipulation or nonthrust mobilization to the upper cervical (C1-2) and upper thoracic (T1-2) spines. Patients were reexamined 48-hours after the initial examination and again completed the outcome measures. The effects of treatment on disability, pain, C1-2 passive rotation range of motion, and motor performance of the deep cervical flexors were examined with a 2-by-2 mixed-model analysis of variance (ANOVA). RESULTS: One hundred seven patients satisfied the eligibility criteria, agreed to participate, and were randomized into the HVLA thrust manipulation (n = 56) and nonthrust mobilization (n = 51) groups. The 2-by-2 ANOVA demonstrated that patients with mechanical neck pain who received the combination of upper cervical and upper thoracic HVLA thrust manipulation experienced significantly (P<.001) greater reductions in disability (50.5%) and pain (58.5%) than those of the nonthrust mobilization group (12.8% and 12.6%, respectively) following treatment. In addition, the HVLA thrust manipulation group had significantly (P<.001) greater improvement in both passive C1-2 rotation range of motion and motor performance of the deep cervical flexor muscles as compared to the group that received nonthrust mobilization. The number needed to treat to avoid an unsuccessful outcome was 1.8 and 2.3 at 48-hour follow-up, using the global rating of change and Neck Disability Index cut scores, respectively. CONCLUSION: The combination of upper cervical and upper thoracic HVLA thrust manipulation is appreciably more effective in the short term than nonthrust mobilization in patients with mechanical neck pain. LEVEL OF EVIDENCE: Therapy, level 1b.

Fernandez-de-las-Penas, C., L. Palomeque-del-Cerro, et al. (2007). "Changes in neck pain and active range of motion after a single thoracic spine manipulation in subjects presenting with mechanical neck pain: a case series." J Manipulative Physiol Ther **30**(4): 312-320.

OBJECTIVE: Our aim was to report changes in neck pain at rest, active cervical range of motion, and neck pain at end-range of cervical motion after a single thoracic spine manipulation in a case series of patients with mechanical neck pain. METHODS: Seven patients with mechanical neck pain (2 men, 5 women), 20 to 33 years old, were included. All patients received a single thoracic manipulation by an experienced manipulative therapist. The outcome measures of these cases series were neck pain at rest, as measured by a numerical pain rating scale; active cervical range of motion; and neck pain at the end of each neck motion (eg, flexion or extension). These outcomes were assessed pre treatment, 5 minutes post manipulation, and 48 hours after the intervention. A repeated-measures analysis was made with parametric tests. Within-group effect sizes were calculated using Cohen d coefficients. RESULTS: A significant (P < .001)

decrease, with large within-group effect sizes (d > 1), in neck pain at rest were found after the thoracic spinal manipulation. A trend toward an increase in all cervical motions (flexion, extension, right or left lateral flexion, and right or left rotation) and a trend toward a decrease in neck pain at the end of each cervical motion were also found, although differences did not reach the significance (P > .05). Nevertheless, medium to large within-group effect sizes (0.5 < d < 1) were found between preintervention data and both postintervention assessments in both active range of motion and neck pain at the end of each neck motion. CONCLUSIONS: The present results demonstrated a clinically significant reduction in pain at rest in subjects with mechanical neck pain immediately and 48 hours following a thoracic manipulation. Although increases in all tested ranges of motion were obtained, none of them reached statistical significance at either posttreatment point. The same was found for pain at the end of range of motion for all tested ranges, with the exception of pain at the end of forward flexion at 48 hours. More than one mechanism likely explains the effects of thoracic spinal manipulation. Future controlled studies comparing spinal manipulation vs spinal mobilization of the thoracic spine are required.

Garra, G., A. J. Singer, et al. (2010). "Heat or cold packs for neck and back strain: a randomized controlled trial of efficacy." Acad Emerg Med **17**(5): 484-489.

OBJECTIVES: Acute back and neck strains are very common. In addition to administering analgesics, these strains are often treated with either heat or cold packs. The objective of this study was to compare the analgesic efficacy of heat and cold in relieving pain from back and neck strains. The authors hypothesized that pain relief would not differ between hot and cold packs. METHODS: This was a randomized, controlled trial conducted at a university-based emergency department (ED) with an annual census of 90,000 visits. ED patients >18 years old with acute back or neck strains were eligible for inclusion. All patients received 400 mg of ibuprofen orally and then were randomized to 30 minutes of heating pad or cold pack applied to the strained area. Outcomes of interest were pain severity before and after pack application on a validated 100-mm visual analog scale (VAS) from 0 (no pain) to 100 (worst pain), percentage of patients requiring rescue analgesia, subjective report of pain relief on a verbal rating scale (VRS), and future desire for similar packs. Outcomes were compared with t-tests and chi-square tests. A sample of 60 patients had 80% power to detect a 15-mm difference in pain scores. RESULTS: Sixty patients were randomized to heat (n = 31) or cold (n = 29) therapy. Mean (+/-standard deviation [SD]) age was 37.8 (+/-14.7) years, 51.6% were female, and 66.7% were white. Groups were similar in baseline patient and pain characteristics. There were no differences between the heat and cold groups in the severity of pain before (75 mm [95% CI = 66 to 83] vs. 72 mm [95% CI = 65 to 78]; p = 0.56) or after (66 mm [95% CI = 57 to 75] vs. 64 mm [95% CI = 56 to 73]; p = 0.75) therapy. Pain was rated better or much better in 16/31 (51.6%) and 18/29 (62.1%) patients in the heat and cold groups, respectively (p = 0.27). There were no between-group

differences in the desire for and administration of additional analgesia. Twenty-five of 31 (80.6%) patients in the heat group and 22 of 29 (75.9%) patients in the cold group would use the same therapy if injured in the future (p = 0.65). CONCLUSIONS: The addition of a 30-minute topical application of a heating pad or cold pack to ibuprofen therapy for the treatment of acute neck or back strain results in a mild yet similar improvement in the pain severity. However, it is possible that pain relief is mainly the result of ibuprofen therapy. Choice of heat or cold therapy should be based on patient and practitioner preferences and availability.

Gonzalez-Iglesias, J., C. Fernandez-de-Las-Penas, et al. (2009). "Short-term effects of cervical kinesio taping on pain and cervical range of motion in patients with acute whiplash injury: a randomized clinical trial." J Orthop Sports Phys Ther **39**(7): 515-521.

DESIGN: Randomized clinical trial. OBJECTIVES: To determine the short-term effects of Kinesio Taping, applied to the cervical spine, on neck pain and cervical range of motion in individuals with acute whiplash-associated disorders (WADs). BACKGROUND: Researchers have begun to investigate the effects of Kinesio Taping on different musculoskeletal conditions (eg, shoulder and trunk pain). Considering the demonstrated short-term effectiveness of Kinesio Tape for the management of shoulder pain, it is suggested that Kinesio Tape may also be beneficial in reducing pain associated with WAD. METHODS AND MEASURES: Forty-one patients (21 females) were randomly assigned to 1 of 2 groups: the experimental group received Kinesio Taping to the cervical spine (applied with tension) and the placebo group received a sham Kinesio Taping application (applied without tension). Both neck pain (11-point numerical pain rating scale) and cervical range-of-motion data were collected at baseline, immediately after the Kinesio Tape application, and at a 24-hour follow-up by an assessor blinded to the treatment allocation of the patients. Mixed-model analyses of variance (ANOVAs) were used to examine the effects of the treatment on each outcome variable, with group as the between-subjects variable and time as the within-subjects variable. The primary analysis was the group-by-time interaction. RESULTS: The group-by-time interaction for the 2-by-3 mixed-model ANOVA was statistically significant for pain as the dependent variable ($F = 64.8$; $P<.001$), indicating that patients receiving Kinesio Taping experienced a greater decrease in pain immediately postapplication and at the 24-hour follow-up (both, $P<.001$). The group-by-time interaction was also significant for all directions of cervical range of motion: flexion ($F = 50.8$; $P<.001$), extension ($F = 50.7$; $P<.001$), right ($F = 39.5$; $P<.001$) and left ($F = 3.8$, $P<.05$) lateral flexion, and right ($F = 33.9$, $P<.001$) and left ($F = 39.5$, $P<.001$) rotation. Patients in the experimental group obtained a greater improvement in range of motion than thosein the control group (all, $P<.001$). CONCLUSIONS: Patients with acute WAD receiving an application of Kinesio Taping, applied with proper tension, exhibited statistically significant improvements immediately following application of the Kinesio Tape and at a

24-hour follow-up. However, the improvements in pain and cervical range of motion were small and may not be clinically meaningful. Future studies should investigate if Kinesio Taping provides enhanced outcomes when added to physical therapy interventions with proven efficacy or when applied over a longer period. LEVEL OF EVIDENCE: Therapy, level 1b.

Jakel, A. and P. von Hauenschild (2011). "Therapeutic effects of cranial osteopathic manipulative medicine: a systematic review." J Am Osteopath Assoc **111**(12): 685-693.

CONTEXT: Cranial osteopathic manipulative medicine (OMM) involves the manipulation of the primary respiratory mechanism to improve structure and function in children and adults. OBJECTIVE: To identify and critically evaluate the literature regarding the clinical efficacy of cranial OMM. DATA SOURCES: The clinical keywords "cranial manipulation" OR "osteopathy in the cranial field" OR "cranial osteopathy" OR "craniosacral technique" were searched in the following electronic databases: EMBASE, MEDLINE In-Process & Other Non-Indexed Citations, The Cochrane Central Register of Controlled Trials, CINAHL (Cumulative Index to Nursing and Allied Health Literature), and AMED (Alternative Medicine). Searches were conducted in April 2011 with no date restriction for when the studies were completed. STUDY SELECTION: Randomized controlled trials and observational studies that measured the effectiveness of cranial OMM on humans were included in the study. Exclusion criteria included non-English language articles, studies not relevant to cranial OMM, animal studies, and studies in which there was no clear indication of the use of cranial OMM. Studies that described the use of cranial OMM with other treatment modalities and that did not perform subgroup analysis were also excluded. The present study did not have criteria regarding type of disease. DATA EXTRACTION: Outcome measures on pain, sleep, quality of life, motor function, and autonomic nervous system function were extracted. The methodological quality of the trials was assessed using the Downs and Black checklist. DATA SYNTHESIS: Of the 8 studies that met the inclusion criteria, 7 were randomized controlled trials and 1 was an observational study. A range of cranial OMM techniques used for the management of a variety of conditions were identified in the included studies. Positive clinical outcomes were reported for pain reduction, change in autonomic nervous system function, and improvement of sleeping patterns. Methodological Downs and Black quality scores ranged from 14 to 23 points out of a maximum of 27 points (overall median score, 16). CONCLUSION: The currently available evidence on the clinical efficacy of cranial OMM is heterogeneous and insufficient to draw definitive conclusions. Because of the moderate methodological quality of the studies and scarcity of available data, further research into this area is needed.

Kay, T. M., A. Gross, et al. (2005). "Exercises for mechanical neck disorders." Cochrane Database Syst Rev(3): CD004250.

BACKGROUND: Neck disorders are common, limit function, and are costly to

individuals and society. Exercise therapy is a commonly used treatment for neck pain. The effectiveness of exercise therapy remains unclear. OBJECTIVES: To assess the effectiveness of exercise therapy to relieve pain, or improve function, disability, patient satisfaction, and global perceived effect in adults with mechanical neck disorders (MND). SEARCH STRATEGY: Computerised bibliographic databases including CENTRAL, MEDLINE, EMBASE, MANTIS, CINAHL, and ICL were searched, without language restrictions, from their beginning up to March 2004, and reference lists of articles were scanned. SELECTION CRITERIA: Selected studies were randomised [RCTs] or quasi-randomised trials and investigated the use of exercise therapy as a treatment in adults with MND with or without headache or radicular signs and symptoms. DATA COLLECTION AND ANALYSIS: Two reviewers independently conducted citation identification, study selection, data abstraction, and methodological quality assessment. Using a random effects model, relative risk and standardized mean differences were calculated. The reasonableness of combining studies was assessed on clinical and statistical grounds. In the absence of heterogeneity, pooled effect measures were calculated. When trials were considered homogenous, results were summarised using a rating system of five levels of evidence. MAIN RESULTS: Thirty-one trials were selected, 19% (van Tulder criteria) to 35% (Jadad scale) had high quality. There is limited evidence of benefit that acute range of motion (AROM) may reduce pain in acute MND (whiplash associated disorder (WAD)) in the short term. There is moderate evidence of benefit that neck strengthening exercises reduce pain, improve function and global perceived effect for chronic neck disorder with headache in the short and long term. There is unclear evidence regarding the impact of a stretching and strengthening program on pain, function and global perceived effect for MND. However, when this stretching and strengthening program focuses on the cervical or cervical and shoulder/thoracic region, there is moderate evidence of benefit on pain in chronic MND [pooled SMD -0.42 (95%CI: -0.83 to -0.01)] and neck disorder plus headache, in the short and long term. There is strong evidence of benefit favouring a multimodal care approach of exercise combined with mobilisation or manipulation for subacute and chronic MND with or without headache, in the short and long term. A program of eye fixation or proprioception exercises imbedded in a more complete program shows moderate evidence of benefit for pain [pooled SMD -0.72 (95% CI:-1.12 to -0.32)], function, and global perceived for chronic MND in the short term, and on pain and function for acute and subacute MND with headache or WAD in the long term. There is limited evidence of benefit on pain relief in the short term for a home mobilisation program with other physical modalities over a program of rest then gradual mobilisation for acute MND or WAD. There was evidence of no difference between the different exercise approaches. AUTHORS' CONCLUSIONS: The evidence summarised in this systematic review indicates that specific exercises may be effective for the treatment of acute and chronic MND, with or without headache. To be of benefit, a stretching and strengthening exercise program should concentrate

on the musculature of the cervical, shoulder-thoracic area, or both. A multimodal care approach of exercise, combined with mobilisation or manipulation for subacute and chronic MND with or without headache, reduced pain, improved function, and global perceived effect in the short and long term. The relative benefit of other treatments (such as physical modalities) compared with exercise or between different exercise programs needs to be explored. The quality of future trials should improve through more effective 'blinding' procedures and better control of compliance and co-intervention. Phase II trials would help identify the most effective treatment characteristics and dosages.

Kerry, R. and A. J. Taylor (2009). "Cervical arterial dysfunction: knowledge and reasoning for manual physical therapists." J Orthop Sports Phys Ther **39**(5): 378-387.

SYNOPSIS: This clinical commentary provides evidence-based information regarding adverse cerebrovascular events in the context of manual therapy assessment and management of the cervical spine. Its aim is to facilitate clinical decision making during diagnosis and treatment of patients presenting to the therapist with cervicocranial pain. Rather than focusing on a traditional view of premanipulative testing as the cornerstone for decision making, we present information concerning the clinical presentation of specific vascular conditions. Additionally, we discuss the assessment and management of musculoskeletal pain in the presence of risk factors for cerebrovascular accident. It is proposed that vascular "red flag" presentations mimic neuromusculoskeletal cervicocranial syndromes. Invariably, the 2 conditions coexist. This reasoning presupposes that some patients who have poor clinical outcomes, or a serious adverse response to treatment, may be those who actually present with undiagnosed vascular pathology. We use 2 case reports to demonstrate how incorporating vascular knowledge into clinical reasoning processes may influence clinical decision making. LEVEL OF EVIDENCE: Level 5.

Kerry, R., A. J. Taylor, et al. (2008). "Manual therapy and cervical arterial dysfunction, directions for the future: a clinical perspective." J Man Manip Ther **16**(1): 39-48.

This paper offers a contemporary, evidence-based perspective on the issue of adverse neurovascular events related to cervical spine manual therapy. The purpose of this perspective is to challenge traditional thought and practice and to recognize areas where practice and research should develop. By considering the themes presented in this paper, the clinician can broaden his or her approach to neurovascular assessment in line with contemporary evidence and thought. We present information based on clinically relevant questions. The nature of vertebrobasilar insufficiency and the utility of pre-treatment testing are examined in light of contemporary evidence. In addition, we report on internal carotid artery pathology, and the significance of appreciating atherosclerosis in clinical decision-making. These later two areas

are not commonly recognized within manual therapy literature, and we suggest that their importance to differential diagnosis of head and neck pain, as well as estimating treatment related risk, is paramount. We propose that the term cervical arterial dysfunction is more appropriate than classically used nomenclature. This term refers more accurately and completely to the range of pathologies at different anatomical sites that manual therapists treating patients with head and neck pain are likely to encounter. Finally, we present a brief review of the medico-legal status pertaining to this area. Although this is English law-related, the themes derived from this section are of interest to all manual therapists.

Martinez-Segura, R., C. Fernandez-de-las-Penas, et al. (2006). "Immediate effects on neck pain and active range of motion after a single cervical high-velocity low-amplitude manipulation in subjects presenting with mechanical neck pain: a randomized controlled trial." J Manipulative Physiol Ther **29**(7): 511-517.

PURPOSE: The objective of this study is to analyze the immediate effects on neck pain and active cervical range of motion after a single cervical high-velocity low-amplitude (HVLA) manipulation or a control mobilization procedure in mechanical neck pain subjects. In addition, we assessed the possible correlation between neck pain and neck mobility. METHODS: Seventy patients with mechanical neck pain (25 males and 45 females, aged 20-55 years) participated in this study. The lateral gliding test was used to establish the presence of an intervertebral joint dysfunction at the C3 through C4 or C4 through C5 levels. Subjects were divided randomly into either an experimental group, which received an HVLA thrust, or a control group, which received a manual mobilization procedure. The outcome measures were active cervical range of motion and neck pain at rest assessed pretreatment and 5 minutes posttreatment by an assessor blinded to the treatment allocation of the patient. Intragroup and intergroup comparisons were made with parametric tests. Within-group effect sizes were calculated using Cohen's d coefficient. RESULTS: Within-group changes showed a significant improvement in neck pain at rest and mobility after application of the manipulation ($P < .001$). The control group also showed a significant improvement in neck pain at rest ($P < .01$), flexion ($P < .01$), extension ($P < .05$), and both lateral flexions ($P < .01$), but not in rotation. Pre-post effect sizes were large for all the outcomes in the experimental group ($d > 1$), but were small to medium in the control mobilization group ($0.2 < d < 0.6$). The intergroup comparison showed that the experimental group obtained a greater improvement than the control group in all the outcome measures ($P < .001$). Decreased neck pain and increased range of motion were negatively associated for all cervical motions: the greater the increase in neck mobility, the less the pain at rest. CONCLUSIONS: Our results suggest that a single cervical HVLA manipulation was more effective in reducing neck pain at rest and in increasing active cervical range of motion than a control mobilization procedure in subjects suffering from mechanical neck pain.

Nordin, M., E. J. Carragee, et al. (2009). "Assessment of neck pain and its associated disorders: results of the Bone and Joint Decade 2000-2010 Task Force on Neck Pain and Its Associated Disorders." J Manipulative Physiol Ther **32**(2 Suppl): S117-140.

STUDY DESIGN: Best evidence synthesis. OBJECTIVE: To critically appraise and synthesize the literature on assessment of neck pain. SUMMARY OF BACKGROUND DATA: The published literature on assessment of neck pain is large and of variable quality. There have been no prior systematic reviews of this literature. METHODS: The Bone and Joint Decade 2000-2010 Task Force on Neck Pain and Its Associated Disorders conducted a critical review of the literature (published 1980-2006) on assessment tools and screening protocols for traumatic and nontraumatic neck pain. RESULTS: We found 359 articles on assessment of neck pain. After critical review, 95 (35%) were judged scientifically admissible. Screening protocols have high predictive values to detect cervical spine fracture in alert, low-risk patients seeking emergency care after blunt neck trauma. Computerized tomography (CT) scans had better validity (in adults and elderly) than radiographs in assessing high-risk and/or multi-injured blunt trauma neck patients. In the absence of serious pathology, clinical physical examinations are more predictive at excluding than confirming structural lesions causing neurologic compression. One exception is the manual provocation test for cervical radiculopathy, which has high positive predictive value. There was no evidence that specific MRI findings are associated with neck pain, cervicogenic headache, or whiplash exposure. No evidence supports using cervical provocative discography, anesthetic facet, or medial branch blocks in evaluating neck pain. Reliable and valid self-report questionnaires are useful in assessing pain, function, disability, and psychosocial status in individuals with neck pain. CONCLUSION: The scientific evidence supports screening protocols in emergency care for low-risk patients; and CT-scans for high-risk patients with blunt trauma to the neck. In nonemergency neck pain without radiculopathy, the validity of most commonly used objective tests is lacking. There is support for subjective self-report assessment in monitoring patients' course, response to treatment, and in clinical research.

Noteboom, J. T., S. C. Allison, et al. (2008). "A primer on selected aspects of evidence-based practice to questions of treatment. Part 2: interpreting results, application to clinical practice, and self-evaluation." J Orthop Sports Phys Ther **38**(8): 485-501.

The process of evidence-based practice (EBP) guides clinicians in the integration of individual clinical expertise, patient values and expectations, and the best available evidence. Becoming proficient with this process takes time and consistent practice, but should ultimately lead to improved patient outcomes. The EBP process entails 5 steps: (1) formulating an appropriate question, (2) performing an efficient literature search, (3) critically appraising the best available evidence, (4) applying the best evidence to clinical practice,

and (5) assessing outcomes of care. This second commentary in a 2-part series will review principles relating to steps 3 through 5 of this 5-step model. The purpose of this commentary is to provide a perspective to assist clinicians in interpreting results, applying the evidence to patient care, and evaluating proficiency with EBP skills in studies of interventions for orthopaedic and sports physical therapy.

Pettersen, V. (2005). "Muscular patterns and activation levels of auxiliary breathing muscles and thorax movement in classical singing." Folia Phoniatr Logop **57**(5-6): 255-277.

The aim of this paper is to present an overview of the findings in seven studies exploring muscular patterns and muscle activation levels in selected muscles by classical singers. In addition, the relationship of these muscles to thorax (TX) movement was investigated. Loading levels and respiratory phasing of upper trapezius (TR), sternocleidomastoideus (STM) and the scalenes (SC) were investigated in vocalization tasks with variation in vocal loudness and pitch. Further, muscle activity in the posterior neck (PN) was investigated in inhalation and phonation and, finally, TR, intercostal (INT), lateral abdominal (OBL) and anterior abdominal (RC) muscle loading in student and professional singers was examined. Muscle activity was recorded by use of an ambulatory four-channel monitoring system (Physiometer PHY 400, Premed, Norway). TX movement was traced with two strain gauge sensors (RES-117) placed around the upper TX and lower TX. A phasing of upper TR activity to INT and OBL activity was discovered, all muscles supporting the expiration phase. During phonation, TR contributes in the compression of the upper TX, thus serving as an accessory muscle of expiration. TR activity is reduced with short breathing cycles and is mostly inactive in simplified speaking tasks. During phonation, professional opera singers activate the expiratory-phased TR, INT, OBL and RC muscles to higher levels than student singers do. STM and SC show correlated activity patterns during inhalation and phonation by classical singers. During demanding singing, expiratory-phased STM and SC activity peaks produce a counterforce to the compression of upper TX at high pitches. As breathing demands are lowered, STM and SC activity are reduced and attain inspiratory phasing. Substantial muscle activity is observed in PN during inhalation and phonation. EMG biofeedback performed on TR and STM have a secondary effect of lowering EMG activity in PN.

Puentedura, E. J., M. R. Landers, et al. (2011). "Thoracic spine thrust manipulation versus cervical spine thrust manipulation in patients with acute neck pain: a randomized clinical trial." J Orthop Sports Phys Ther **41**(4): 208-220.

STUDY DESIGN: Randomized clinical trial. OBJECTIVE: To determine if patients who met the clinical prediction rule (CPR) criteria for the success of thoracic spine thrust joint manipulation (TJM) for the treatment of neck pain would have a different outcome if they were treated with a cervical spine TJM. BACKGROUND: A CPR had been proposed to identify patients with neck

pain who would likely respond favorably to thoracic spine TJM. Research on validation of that CPR had not been completed when this trial was initiated. In our clinical experience, though many patients with neck pain responded favorably to thoracic spine TJM, they often reported that their symptomatic cervical spine area had not been adequately addressed. METHODS: Twenty-four consecutive patients, who presented to physical therapy with a primary complaint of neck pain and met 4 out of 6 of the CPR criteria for thoracic TJM, were randomly assigned to 1 of 2 treatment groups. The thoracic group received thoracic TJM and a cervical range-of-motion (ROM) exercise for the first 2 sessions, followed by a standardized exercise program for an additional 3 sessions. The cervical group received cervical TJM and the same cervical ROM exercise for the first 2 sessions, and the same exercise program given to the thoracic group for the next 3 sessions. Outcome measures collected at 1 week, 4 weeks, and 6 months from start of treatment included the Neck Disability Index, numeric pain rating scale, and Fear-Avoidance Beliefs Questionnaire. RESULTS: Patients who received cervical TJM demonstrated greater improvements in Neck Disability Index (P </=.001) and numeric pain rating scale (P </=.003) scores at all follow-up times. There was also a statistically significant improvement in the Fear-Avoidance Beliefs Questionnaire physical activity subscale score at all follow-up times for the cervical group (P </=.004). The number needed to treat to avoid an unsuccessful overall outcome was 1.8 at 1 week, 1.6 at 4 weeks, and 1.6 at 6 months. CONCLUSION: Patients with neck pain who met 4 of 6 of the CPR criteria for successful treatment of neck pain with a thoracic spine TJM demonstrated a more favorable response when the TJM was directed to the cervical spine rather than the thoracic spine. Patients receiving cervical TJM also demonstrated fewer transient side-effects. LEVEL OF EVIDENCE: Therapy, level 1b.

Saavedra-Hernandez, M., A. M. Castro-Sanchez, et al. (2012). "Short-Term Effects of Kinesiotaping Versus Cervical Thrust Manipulation in Patients With Mechanical Neck Pain: A Randomized Clinical Trial." J Orthop Sports Phys Ther.

STUDY DESIGN: Randomized clinical trial. OBJECTIVE: To compare the effectiveness of cervical spine thrust manipulation and Kinesiotaping(R) applied to the neck on self-reported pain and disability, and cervical range of motion in individuals with mechanical neck pain. BACKGROUND: The effectiveness of cervical manipulation has received considerable attention in the literature. However, because some patients cannot tolerate cervical thrust manipulations, alternative therapeutic options should be investigated. METHODS: Eighty patients (36 females) were randomly assigned to 1 of 2 groups: the manipulative group received 2 cervical thrust manipulations, whereas the tape group received Kinesiotaping(R) applied to the neck. Neck pain (11-point numeric pain rating scale), disability (Neck Disability Index), and cervical range of motion data were collected at baseline and 1 week after the intervention by an assessor blinded to the treatment allocation of the patients. Mixed-model ANOVAs were used to examine the effects of the treatment on each outcome variable with group as the between-subject variable and time as

the within-subject variable. The primary analysis was the Group by Time interaction. RESULTS: No significant Group by Time interactions were found for pain (F=1.892; P=0.447) or disability (F=0.115; P=0.736). The Group by Time interaction was statistically significant for right (F = 7.317, P=0.008) and left (F=9.525, P=0.003) cervical rotation range of motion with the patients receiving the cervical thrust manipulation experiencing greater improvement in cervical rotation than those treated with Kinesiotape (P < 0.01). No significant Group by Time interactions were found for cervical spine range of motion for flexion (F=0.944; P= 0.334), extension (F=0.122; P=0.728), and right (F=0.220; P=0.650) and left (F=0.389, P= 0.535) lateral-flexion. CONCLUSIONS: Patients with mechanical neck pain receiving cervical thrust manipulation or treated with Kinesiotaping(R) exhibited similar reductions in neck pain intensity and disability and similar changes in active cervical range of motion except for rotation. Changes in neck pain surpassed the minimal clinically important difference (MCID), whereas changes in disability did not. Changes in cervical range of motion were small and not clinically meaningful. Because we did not include a control or placebo group in this study, we cannot rule out placebo effect or natural changes over time as potential reasons for the improvements measured in both groups. LEVEL OF EVIDENCE: Therapy, Level 1b. J Orthop Sports Phys Ther, Epub 20 April 2012. doi:10.2519/jospt.2012.4086.

Sandow, E. (2011). "Case studies in cervicothoracic spine function evaluation and treatment of two dancers with mechanical neck pain." J Dance Med Sci **15**(1): 37-44.

It has been reported that manual therapy directed at the thoracic spine followed by exercise may improve outcomes in patients with mechanical neck pain. At this point, there is little available data on dancers with neck pain, and it is unclear whether this type of treatment is appropriate for restoring the rigorous level of activity required of the dancer. The purpose of this study was to review the evaluation, clinical decision-making process, and treatment of two dancers-one with acute and the other with chronic neck pain-who fell into the classification of patients who might benefit from an intervention to the thoracic spine. The two participants were a musical theater dancer with an acute onset of neck pain and a retired dancer who was an active dance company director with an 11-year history of chronic neck pain. Both participants went through a standard examination and were treated with mobilizations to the upper thoracic spine followed by therapeutic exercises. In both cases, successful outcomes were achieved immediately after treatment and up to six months after discharge from physical therapy.

Spengos, K., G. Tsivgoulis, et al. (2006). "Spinal cord stroke in a ballet dancer." J Neurol Sci **244**(1-2): 159-161.

Fibrocartilaginous embolism of the intervertebral disc represents an uncommon cause of spinal cord infarction. We present the case of a previously healthy 30-year old ballet dancer who noted acute severe neck pain shortly after an intensive training session and developed weakness and numbness of both arms, as well as difficulties in emptying the bladder and bowel. Her clinical presentation and neuroimaging studies including diffusion

weighted imaging were consistent with a spinal cord infarction in the anterior spinal territory at the C3-C6 spinal cord level. Although no histological confirmation was obtained, lack of evidence of other plausible diagnoses in the setting of the patient's clinical presentation and neuroimaging findings made fibrocartilaginous embolism the most likely etiopathogenetic mechanism of spinal stroke.

Thiel, H. and G. Rix (2005). "Is it time to stop functional pre-manipulation testing of the cervical spine?" Man Ther **10**(2): 154-158.

The combined extended and rotated cervical spine position has been postulated to affect vertebral artery blood flow by primarily causing a narrowing of the vessel lumen, usually within the artery contralateral to the side of head rotation. The production of brainstem symptoms during the manoeuvre has generally been considered to be a positive test result. As a consequence, functional pre-manipulation testing of the cervical spine has been part of clinical screening undertaken by chiropractors and other manual practitioners to rule out the risk of possible injury to the vertebral artery. To date, these testing procedures are taught to students and carried out in daily clinical practice, despite the considerable controversy that exists about their validity. This paper considers and discusses the usefulness of functional pre-manipulation testing for clinical scenarios, involving dissection, spasm or stenosis of the vertebral artery, and makes the following recommendations: (1) Practitioners must assess the patient thoroughly, through careful history taking and physical examination, for the possibility of vertebral artery dissection. It is important to note that vertebral artery dissection (VAD) may present as pain only, and may not be associated with symptoms and signs of brainstem ischaemia. (2) If there is a strong likelihood of VAD, provocative pre-manipulation tests should not be performed, and the patient must be referred appropriately. (3) In the patient presenting with symptoms of brainstem ischaemia due to non-dissection stenotic vertebral artery pathologies, provocative testing is very unlikely to provide any useful additional diagnostic information. (4) In the patient with unapparent vertebral artery pathology, where spinal manipulative therapy (SMT) is considered as the treatment of choice, provocative testing is very unlikely to provide any useful information in assessing the probability of manipulation induced vertebral artery injury.

Topolska, M., S. Chrzan, et al. (2012). "Evaluation of the effectiveness of therapeutic massage in patients with neck pain." Ortop Traumatol Rehabil **14**(2): 115-124.

Summary Background: Neck pain is one of the most common musculoskeletal ailments. The aim of this study was to evaluate the effectiveness and impact of therapeutic massage on the range of motion in patients with neck pain. Material and methods: The study involved 60 patients aged 37-82 years (mean age: 62.8 9.86 years) treated for neck pain at the Rehabilitation Department of Zamosc University of Management and Administration. The patients were divided into two groups: one (30 persons)

received kinesiotherapy and physiotherapy, and the other group (30 persons) additionally received therapeutic massage. The effectiveness of rehabilitation was assessed with a Saunders digital inclinometer, the Neck Disability Index (NDI) and a Visual Analogue Scale (VAS).Results: Both groups did not differ significantly in terms of NDI and VAS scores at baseline (NDI: p = 0.56, VAS: P = 0.231) and after rehabilitation (NDI: p = 0.203; VAS: P = 0.401). The NDI questionnaire and VAS revealed a significant pain reduction (p <0.001), and improved performance and function (p <0.001) after rehabilitation in both groups. Patients who had received massage demonstrated a statistically significant improvement in the range of flexion (p = 0.022), lateral bend to the right (p = 0.018), and lateral bend to the left (p = 0.003). Conclusions:1. Therapeutic massage increases ranges of motion.2. The effectiveness of therapeutic massage is comparable to the effectiveness of rehabilitation based only on physical therapy and kinesiotherapy.

Tsung, P. A. and G. J. Mulford (1998). "Ballroom dancing and cervical radiculopathy: a case report." Arch Phys Med Rehabil **79**(10): 1306-1308.

Dance injuries associated with cervical radiculopathy have not been described in the literature. This report describes the case of an international-style ballroom dancer who developed a cervical radiculopathy as a result of frequent lateral rotation and hyperextension of the cervical spine during dancing. The patient's symptoms and signs suggestive of a left C7 radiculopathy were confirmed and documented by both magnetic resonance imaging and electrodiagnostic testing. The patient was treated conservatively with activity modification, nonsteroidal anti-inflammatory drugs, and alternative medicine approaches, including herbs and acupuncture. Her neck pain and cervical radicular symptoms declined in severity, but continued even 4 1/2 months after the onset of her symptoms. She did not wish to try steroids either through an oral or epidural route and refused surgical intervention. This case report illustrates an unconventional manner in which a left cervical radiculopathy was clinically produced. The neck motions and positions of frequent hyperextension and lateral rotation demonstrated by this ballroom dancer simulated a pattern and sequence of movements that promoted the development of signs and symptoms of a left cervical radiculopathy.

Wainner, R. S., J. M. Whitman, et al. (2007). "Regional interdependence: a musculoskeletal examination model whose time has come." J Orthop Sports Phys Ther **37**(11): 658-660.

For physical therapists to justify our services for patients with musculoskeletal problems, we need to achieve clinical outcomes superior to those associated with natural history or due to the passage of time. If a patient's presentation is unclear or if the response to intervention is less favorable than expected, practical application of the regional-interdependence model may add clarity to the patient's clinical picture and guide subsequent interventions. Likewise, further investigation of the regional-interdependence concept in a systematic fashion may add clarity to the nature of many musculoskeletal problems and

guide subsequent decision making in clinical care.

Whitman, J. M., J. M. Fritz, et al. (2005). "Manual physical therapy, cervical traction, and strengthening exercises in patients with cervical radiculopathy: a case series." J Orthop Sports Phys Ther **35**(12): 802-811.

STUDY DESIGN: A case series of consecutive patients with cervical radiculopathy. BACKGROUND: A multitude of physical therapy interventions have been proposed to be effective in the management of cervical radiculopathy. However, outcome studies using consistent treatment approaches on a well-defined sample of patients are lacking. The purpose of this case series is to describe the outcomes of a consecutive series of patients presenting to physical therapy with cervical radiculopathy and managed with the use of manual physical therapy, cervical traction, and strengthening exercises. CASE DESCRIPTION: Eleven consecutive patients (mean age, 51.7 years; SD, 8.2) who presented with cervical radiculopathy on the initial examination were treated with a standardized approach, including manual physical therapy, cervical traction, and strengthening exercises of the deep neck flexors and scapulothoracic muscles. At the initial evaluation all patients completed self-report measures of pain and function, including a numeric pain rating scale (NPRS), the Neck Disability Index (NDI), and the Patient-Specific Functional Scale (PSFS). All patients again completed the outcome measures, in addition to the global rating of change (GROC), at the time of discharge from therapy and at a 6-month follow-up session OUTCOMES: Ten of the 11 patients (91%) demonstrated a clinically meaningful improvement in pain and function following a mean of 7.1 (SD, 1.5) physical therapy visits and at the 6-month follow-up. DISCUSSION: Ninety-one percent (10 of 11) of patients with cervical radiculopathy in this case series improved, as defined by the patients classifying their level of improvement as at least "quite a bit better" on the GROC. However, because a cause-and-effect relationship cannot be inferred from a case series, follow-up randomized clinical trials should be performed to further investigate the effectiveness of manual physical therapy, cervical traction, and strengthening exercises in a homogeneous group of patients with cervical radiculopathy.

Young, I. A., L. A. Michener, et al. (2009). "Manual therapy, exercise, and traction for patients with cervical radiculopathy: a randomized clinical trial." Phys Ther **89**(7): 632-642.

BACKGROUND: To date, optimal strategies for the management of patients with cervical radiculopathy remain elusive. Preliminary evidence suggests that a multimodal treatment program consisting of manual therapy, exercise, and cervical traction may result in positive outcomes for patients with cervical radiculopathy. However, limited evidence exists to support the use of mechanical cervical traction in patients with cervical radiculopathy. OBJECTIVE: The purpose of this study was to examine the effects of manual therapy and exercise, with or without the addition of cervical traction, on pain, function, and disability in patients with cervical radiculopathy. DESIGN: This

study was a multicenter randomized clinical trial. SETTING: The study was conducted in orthopedic physical therapy clinics. PATIENTS: Patients diagnosed with cervical radiculopathy (N=81) were randomly assigned to 1 of 2 groups: a group that received manual therapy, exercise, and intermittent cervical traction (MTEXTraction group) and a group that received manual therapy, exercise, and sham intermittent cervical traction (MTEX group). INTERVENTION: Patients were treated, on average, 2 times per week for an average of 4.2 weeks. MEASUREMENTS: Outcome measurements were collected at baseline and at 2 weeks and 4 weeks using the Numeric Pain Rating Scale (NPRS), the Patient-Specific Functional Scale (PSFS), and the Neck Disability Index (NDI). RESULTS: There were no significant differences between the groups for any of the primary or secondary outcome measures at 2 weeks or 4 weeks. The effect size between groups for each of the primary outcomes was small (NDI=1.5, 95% confidence interval [CI]=-6.8 to 3.8; PSFS=0.29, 95% CI=-1.8 to 1.2; and NPRS=0.52, 95% CI=-1.8 to 1.2). LIMITATIONS: The use of a nonvalidated clinical prediction rule to diagnose cervical radiculopathy and the lack of a control group without treatment were limitations of this study. CONCLUSIONS: The results suggest that the addition of mechanical cervical traction to a multimodal treatment program of manual therapy and exercise yields no significant additional benefit to pain, function, or disability in patients with cervical radiculopathy.

Please remember to update your orthopaedic section profile, thank you!
https://www.orthopt.org/surveys/membership_directory.php