

## 2. LBP

### Patient's desires and needs

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#### **People with low back pain want clear, consistent and personalised information on prognosis, treatment options and self-management strategies: a systematic review**

Yuan ZLim<sup>a</sup>LouisaChou<sup>a</sup>Rebecca TMAu<sup>a</sup>KL Maheeka DSeneviwickrama<sup>a</sup>Flavia

MCicuttini<sup>a</sup>Andrew MBriggs<sup>b</sup>KayeSullivan<sup>c</sup>Donna MURquhart<sup>a</sup>Anita EWluka<sup>a</sup>

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Abstract

Question

What health information needs are perceived by people with low back pain?

Design

Systematic review of publications examining perceived health information needs related to low back pain identified through Medline, EMBASE, CINAHL and PsycINFO (1990 to 2018).

Participants

Adults with low back pain of any duration.

Data extraction and analysis

Two reviewers independently extracted descriptive data regarding study design and methodology, and assessed risk of bias. Aggregated findings of the perceived needs of people with low back pain regarding health information were meta-synthesised.

Results

Forty-one studies (34 qualitative, four quantitative and three mixed-methods) were identified. Two major areas of perceived health information needs for low back pain emerged. The first major area was needs related to information content: general information related to low back pain, its cause and underlying pathology; strong desire for diagnosis and imaging; prognosis, future disability and effect on work capacity; precipitants and management of flares; general management approaches; self-management strategies; prevention; and support services. The second major area of needs related to how the information was delivered. People with low back pain wanted clear, consistent information delivered in suitable tone and understandable language.

Conclusion

Available data suggest that the information needs of people with low back pain are centred around their desire for a diagnosis, potentially contributing to expectations for and overuse of imaging. People with low back pain expressed a strong desire for clear, consistent and personalised information on prognosis, treatment options and self-management strategies, related to healthcare and occupational issues. To correct unhelpful beliefs and optimise delivery of evidence-based therapy, patient and healthcare professional education (potentially by an integrated public health approach) may be warranted

## 7. PELVIC ORGANS/WOMAN'S HEALTH

### Comparisons of hysterectomies

#### **Sacrospinous hysteropexy vs vaginal hysterectomy with uterosacral ligament suspension in women with uterine prolapse stage 2 or higher: Observational follow-up of a multicentre randomised trial**

BMJ — Schulten SFM, et al.  
September 13, 2019

In this observational follow-up of SAVE U (sacrospinous fixation vs vaginal hysterectomy in treatment of uterine prolapse  $\geq 2$ ) randomised controlled trial, researchers assessed the efficacy and success of uterus preserving sacrospinous hysteropexy as an alternative to vaginal hysterectomy with uterosacral ligament suspension five years after surgery in the surgical treatment of uterine prolapse. Between November 27, 2009, and March 12, 2012, 208 women were randomly assigned to sacrospinous hysteropexy (n = 103) or vaginal hysterectomy with uterosacral ligament suspension (n = 105).

According to findings, significantly fewer anatomical recurrences of the apical compartment with bothersome bulge symptoms or repeat surgery were discovered after sacrospinous hysteropexy vs vaginal hysterectomy with uterosacral ligament suspension after five years of follow-up. A higher proportion of women had a composite success outcome after hysteropexy. Time-to-event analysis did not show any differences between the procedures in outcomes.

**Pelvic floor therapy**

AMA. 2019 Sep 17;322(11):1066-1076. doi: 10.1001/jama.2019.12467.

**Effect of Behavioral and Pelvic Floor Muscle Therapy Combined With Surgery vs Surgery Alone on Incontinence Symptoms Among Women With Mixed Urinary Incontinence: The ESTEEM Randomized Clinical Trial.**

Sung VW<sup>1</sup>, Borello-France D<sup>2</sup>, Newman DK<sup>3</sup>, Richter HE<sup>4</sup>, Lukacz ES<sup>5</sup>, Moalli P<sup>6</sup>, Weidner AC<sup>7</sup>, Smith AL<sup>8</sup>, Dunivan G<sup>9</sup>, Ridgeway B<sup>10</sup>, Nguyen JN<sup>11</sup>, Mazloomdoost D<sup>12</sup>, Carper B<sup>13</sup>, Gantz MG<sup>13</sup>; NICHD Pelvic Floor Disorders Network.

**IMPORTANCE:**

Mixed urinary incontinence, including both stress and urgency incontinence, has adverse effects on a woman's quality of life. Studies evaluating treatments to simultaneously improve both components are lacking.

**OBJECTIVE:**

To determine whether combining behavioral and pelvic floor muscle therapy with midurethral sling is more effective than sling alone for improving mixed urinary incontinence symptoms.

**DESIGN, SETTING, AND PARTICIPANTS:**

Randomized clinical trial involving women 21 years or older with moderate or severe stress and urgency urinary incontinence symptoms for at least 3 months, and at least 1 stress and 1 urgency incontinence episode on a 3-day bladder diary. The trial was conducted across 9 sites in the United States, enrollment between October 2013 and April 2016; final follow-up October 2017.

**INTERVENTIONS:**

Behavioral and pelvic floor muscle therapy (included 1 preoperative and 5 postoperative sessions through 6 months) combined with midurethral sling (n = 209) vs sling alone (n = 207).

**MAIN OUTCOMES AND MEASURES:**

The primary outcome was change between baseline and 12 months in mixed incontinence symptoms measured by the Urogenital Distress Inventory (UDI) long form; range, 0 to 300 points; minimal clinically important difference, 35 points, with higher scores indicating worse symptoms.

**RESULTS:**

Among 480 women randomized (mean [SD] age, 54.0 years [10.7]), 464 were eligible and 416 (86.7%) had postbaseline outcome data and were included in primary analyses. The UDI score in the combined group significantly decreased from 178.0 points at baseline to 30.7 points at 12 months, adjusted mean change -128.1 points (95% CI, -146.5 to -109.8). The UDI score in the sling-only group significantly decreased from 176.8 to 34.5 points, adjusted mean change -114.7 points (95% CI, -133.3 to -96.2). The model-estimated between-group difference (-13.4 points; 95% CI, -25.9 to -1.0; P = .04) did not meet the minimal clinically important difference threshold. Related and unrelated serious adverse events occurred in 10.2% of the participants (8.7% combined and 11.8% sling only).

**CONCLUSIONS AND RELEVANCE:**

Among women with mixed urinary incontinence, behavioral and pelvic floor muscle therapy combined with midurethral sling surgery compared with surgery alone resulted in a small statistically significant difference in urinary incontinence symptoms at 12 months that did not meet the prespecified threshold for clinical importance.

**Preterm and cognitive impact**

BMJ Open. 2019 Sep 8;9(9):e028982. doi: 10.1136/bmjopen-2019-028982.

**Impact of gestational age on child intelligence, attention and executive function at age 5: a cohort study.**

Sejer EPF<sup>1</sup>, Bruun FJ<sup>2</sup>, Slavensky JA<sup>2</sup>, Mortensen EL<sup>3</sup>, Schiøler Kesmodel U<sup>2,4</sup>.

**OBJECTIVES:**

Preterm birth can affect cognition, but other factors including parental education and intelligence may also play a role, but few studies have adjusted for these potential confounders. We aimed to assess the impact of gestational age (GA), late preterm birth (34 to <37 weeks GA) and very to moderately preterm birth (<34 weeks GA) on intelligence, attention and executive function in a population of Danish children aged 5 years.

**DESIGN:**

Population-based prospective cohort study.

**SETTING:**

Denmark 2003-2008.

**PARTICIPANTS:**

A cohort of 1776 children and their mothers sampled from the Danish National Birth Cohort with information on GA, family and background factors and completed neuropsychological assessment at age 5.

**PRIMARY OUTCOME MEASURES:**

Wechsler Preschool and Primary Scale of Intelligence-Revised, Test of Everyday Attention for Children at Five and Behaviour Rating Inventory of Executive Function scores.

**RESULTS:**

For preterm birth <34 weeks GA (n=8), the mean difference in full-scale intelligence quotient(IQ) was -10.6 points (95% CI -19.4 to -1.8) when compared with the term group  $\geq 37$  weeks GA (n=1728), and adjusted for potential confounders. For the teacher-assessed Global Executive Composite, the mean difference was 5.3 points (95% CI 2.4 to 8.3) in the adjusted analysis, indicating more executive function difficulties in the preterm group <34 weeks GA compared with the term group. Maternal intelligence and parental education were weak confounders. No associations between late preterm birth 34 to <37 weeks GA (n=40) and poor cognition were shown.

**CONCLUSIONS:**

This study showed substantially lower intelligence and poorer executive function in children born <34 weeks GA compared with children born at term. GA may play an important role in determining cognitive abilities independent of maternal intelligence and parental education. Studies with larger sample sizes are needed to confirm these findings, as the proportion of children born preterm in this study population was small.

## Vit D mothers and children

Ann Nutr Metab. 2019;75(1):39-46. doi: 10.1159/000502044. Epub 2019 Aug 7.

**Vitamin D in Term Newborns: Relation with Maternal Concentrations and Birth Weight.**

Esmeraldo CUP<sup>1</sup>, Martins MEP<sup>1</sup>, Maia ER<sup>1</sup>, Leite JLA<sup>1</sup>, Ramos JLS<sup>2</sup>, Gonçalves J Jr<sup>3</sup>, Neta CM<sup>3</sup>, Suano-Souza FI<sup>4,5</sup>, Sarni ROS<sup>6</sup>.

**OBJECTIVE:**

To evaluate vitamin D serum levels of term newborns and relate them to maternal concentrations and birth weight.

**METHODS:**

Cross-sectional study carried out with 225 mothers and their term newborns. Data collected were maternal health, prenatal care, gestational, and anthropometric data of the newborns. The following laboratory tests were performed: serum levels of 25(OH)D, calcium, phosphorus, magnesium, and alkaline phosphatase.

**RESULTS:**

Of the 225 newborns included in the study, 119 (52.9%) were males, the mean birth weight was  $3,198 \pm 421.4$  g, and the gestational age was  $39.1 \pm 1.1$  weeks. Of these, 20 (8.9%) were small and 12 (5.3%) were large for gestational age. A 25(OH)D sufficiency was found in 25.8% of mothers and 92% of newborns. The mean 25(OH)D concentrations of newborns was higher than that of the mothers  $48.7 \pm 15.2$  ng/mL vs.  $26.0 \pm 6.7$  ng/dL ( $p < 0.001$ ), correlating inversely with birth weight ( $r = -0.249$ ;  $p < 0.001$ ). Small for gestational age (SGA) newborns had higher concentrations of 25(OH)D compared to adequate and large for age ( $p < 0.001$ ).

**CONCLUSION:**

In conclusion, this study showed strong positive correlation between maternal and neonatal 25(OH)D concentrations, with higher values in newborns. The highest 25(OH)D concentrations were found in SGA term infants. We speculated these findings could be influenced by newborn body composition.

**Breast feeding protective CV effect**

American Heart Journal Volume 217, November 2019, Pages 84-93

**Small-for-gestational-age birth is linked to cardiovascular dysfunction in early childhood**

MatteoCastagnoMD<sup>a</sup>VeronicaMenegonMD<sup>b</sup>AliceMonzaniMD, PhD<sup>a</sup>SaraZanettaMD<sup>a</sup>Gioel GabrioSeccoMD, PhD<sup>c</sup>RobertaRossoMD<sup>d</sup>MarcoBinottiMD, PhD<sup>e</sup>LuigiMaiuriProf<sup>a</sup>CarloDi MarioProf<sup>f</sup>DiegoGazzoloProf<sup>g</sup>FedericaFerreroMD<sup>e</sup>GiuliaGenoniMD, PhD<sup>e</sup>

<https://doi.org/10.1016/j.ahj.2019.08.004>

**Background**

The aim of this study was to assess clinical and echographic markers of cardiovascular dysfunction in infants born small for gestational age (SGA) compared to a control group of subjects born adequate for gestational age (AGA).

**Methods**

This was a single-center cross-sectional case-control study. We recruited 20 SGA and 20 gestational age-matched AGA subjects at 24 months of age.

The study population underwent anthropometric and Doppler 2-dimensional echocardiographic assessments, and carotid artery intima-media thickness (cIMT) and endothelium-dependent vasodilation evaluation (FMD).

The pressure-volume curve during diastole was calculated using the algorithm for the elastance calculation on 1 single beat.

**Results**

SGA children showed lower stroke volume, lower left ventricle (LV) dimensions and volume, and greater LV thickness. Diastolic function was impaired in SGA with lower capacitance and higher elastance.

Birth weight standard deviation score was positively associated with capacitance and negatively associated with  $E/E'$  ratio and elastance, and in SGA infants, the end-diastolic pressure-related volume curve was shifted to the left compared to AGA.

cIMT and systemic vascular resistance were significantly higher, while FMD was lower, in SGA compared to AGA; birth weight standard deviation score was directly correlated with FMD and inversely correlated with cIMT.

Finally, a longer breastfeeding duration was associated to a lower cIMT even after correction for confounding factors.

**Conclusions**

This study shows that infants born SGA present an early and subtle cardiovascular dysfunction compared to AGA controls. These alterations are strongly related to weight at birth. Finally, breastfeeding exerts an important protective and beneficial cardiovascular effect.

**Metabolic syndrome made worse with carbohydrate intake****Reviews and Meta-analyses****Carbohydrate intake and risk of metabolic syndrome: a dose-response meta-analysis from observational studies**

Ya-ShuLiu<sup>ab1</sup>Qi-JunWu<sup>ab1</sup>YangXia<sup>ab1</sup>Jia-YuZhang<sup>ab1</sup>Yu-TingJiang<sup>ab1</sup>QingChang<sup>ab1</sup>Yu-HongZhao<sup>ab1</sup>

<https://doi.org/10.1016/j.numecd.2019.09.003>Get rights and content

**Highlights**

- Carbohydrates intake is associated with more likelihood of having metabolic syndrome.
- Linear dose-response relationships were found, with a 2.6% increase in the risk of metabolic syndrome per 5% energy intake from carbohydrates.
- Association between carbohydrates intake and risk of MetS appears to be affected by region.

**Background and Aims**

Epidemiological association studies have shown inconsistent findings between carbohydrate intake and risk of metabolic syndrome (MetS). Therefore, we aim to conduct the first dose-response meta-analysis to investigate this effect.

**Methods and Results**

A systematic search in PubMed and Web of Science databases throughout June 01 2019, together with relevant literature scrutiny, was performed to identify related studies for inclusion into the study. We calculated the odds ratios (ORs) with 95% confidence intervals (CIs) using a random effect model. Furthermore, subgroup, sensitivity, heterogeneity, and publication bias analyses were performed. This meta-analysis included 14 cross-sectional and four cohort studies, totaling 284,638 participants and 69,554 MetS cases. The highest versus the lowest carbohydrate intake values were associated with increased risk of MetS (OR: 1.253, 95% CI: 1.147-1.368), with moderate heterogeneity ( $I^2=54.5\%$ ). Using dose-response analysis, we found a linear association between carbohydrate consumption and MetS risk with a corresponding OR of 1.026 (95% CI, 1.004-1.048) and with significant heterogeneity ( $I^2=82.0\%$ ) at 5% energy from carbohydrate intake. We have found similar results using subgroup analyses for major study characteristics and adjustment for confounders. Sensitivity analysis further enhanced the robustness of the results, and no publication bias was detected.

**Conclusion**

Carbohydrate intake is associated with an increased risk of developing MetS. Therefore, additional large prospective cohort studies are warranted to confirm our findings.

## 8. VISCERA

### Leisure activity improves life expectancy

J Am Heart Assoc. 2019 Sep 17;8(18):e012657. doi: 10.1161/JAHA.119.012657. Epub 2019 Sep 9.

#### **Associations of Leisure-Time Physical Activity and Television Viewing With Life Expectancy Free of Nonfatal Cardiovascular Disease: The ARIC Study.**

Cuthbertson CC<sup>1</sup>, Tan X<sup>2</sup>, Heiss G<sup>1</sup>, Kucharska-Newton A<sup>1</sup>, Nichols HB<sup>1</sup>, Kubota Y<sup>3</sup>, Evenson KR<sup>1</sup>.

**Background** High levels of physical activity have been associated with longer life expectancy free of cardiovascular disease (CVD), but specific types of CVD and sedentary behavior have not been examined. We examined associations of leisure-time moderate-to-vigorous physical activity (LTPA) and television viewing with life expectancy free of 3 types of CVD.

**Methods and Results** We included 13 534 participants from the ARIC (Atherosclerosis Risk in Communities) cohort. We used multistate survival models to estimate associations of LTPA in the past year (no LTPA, less than the median, equal to or greater than the median) and television viewing (often or very often, sometimes, seldom or rarely) with life expectancy at age 50 free of nonfatal coronary heart disease (CHD), stroke, and heart failure (HF). Over 27 years of follow-up, 4519 participants developed one of the 3 nonfatal CVDs and 5475 deaths occurred. Compared with participants who engaged in no LTPA, participants who engaged in LTPA equal to or greater than the median had longer life expectancy free of nonfatal CHD (men: 1.5 years [95% CI, 1.0-2.0]; women: 1.6 years [95% CI, 1.1-2.2]), stroke (men: 1.8 years [95% CI, 1.2-2.3]; women: 1.8 years [95% CI, 1.3-2.3]), and HF (men: 1.6 years [95% CI, 1.1-2.1]; women: 1.7 years [95% CI, 1.2-2.2]). Compared with viewing more television, watching less television was associated with longer life expectancy free of CHD, stroke, and HF ( $\approx 0.8$  year).

**Conclusions** Higher levels of LTPA and less television viewing were associated with longer life expectancy free of CHD, stroke, and HF. Engaging in LTPA and watching less television may increase the number of years lived free of CHD, stroke, and HF.



**13 D. SLEEP****White matter changes in OSA**

Sleep. 2019 Jul 1. pii: zsz120. doi: 10.1093/sleep/zsz120

**Altered structural brain network resulting from white matter injury in obstructive sleep apnea.**

Lee MH<sup>1,2</sup>, Yun CH<sup>3</sup>, Min A<sup>4</sup>, Hwang YH<sup>4</sup>, Lee SK<sup>5</sup>, Kim DY<sup>4</sup>, Thomas RJ<sup>6</sup>, Han BS<sup>7</sup>, Shin C<sup>5,8</sup>.

**STUDY OBJECTIVES:**

To assess, using fractional anisotropy (FA) analysis, alterations of brain network connectivity in adults with obstructive sleep apnea (OSA). Abnormal networks could mediate clinical functional deficits and reflect brain tissue injury.

**METHODS:**

Structural brain networks were constructed using diffusion tensor imaging (DTI) from 165 healthy (age  $57.99 \pm 6.02$  years, male 27.9%) and 135 OSA participants (age  $59.01 \pm 5.91$  years, male 28.9%) and global network properties (strength, global efficiency, and local efficiency) and regional efficiency were compared between groups. We examined MRI biomarkers of brain tissue injury using FA analysis and its effect on the network properties.

**RESULTS:**

Differences between groups of interest were noted in global network properties (p-value < 0.05, corrected), and regional efficiency (p-value < 0.05, corrected) in the left middle cingulate and paracingulate gyri, right posterior cingulate gyrus, and amygdala. In FA analysis, OSA participants showed lower FA values in white matter (WM) of the right transverse temporal, anterior cingulate and paracingulate gyri, and left postcentral, middle frontal and medial frontal gyri, and the putamen. After culling fiber tracts through WM which showed significant differences in FA, we observed no group difference in network properties.

**CONCLUSIONS:**

Changes in WM integrity and structural connectivity are present in OSA participants. We found that the integrity of WM affected brain network properties. Brain network analysis may improve understanding of neurocognitive deficits in OSA, enable longitudinal tracking, and provides explanations for specific symptoms and recovery kinetics.

**Sleep health**

Sleep. 2019 May 13. pii: zsz116. doi: 10.1093/sleep/zsz116.

**Empirical derivation of cut-off values for the sleep health metric and its relationship to cardiometabolic morbidity: Results from the Midlife in the United States (MIDUS) study.**

Brindle RC<sup>1,2</sup>, Yu L<sup>1</sup>, Buysse DJ<sup>1</sup>, Hall MH<sup>1</sup>.

**STUDY OBJECTIVES:**

Emerging evidence supports a multidimensional perspective of sleep in the context of health. The sleep health model, and composite sleep health score, are increasingly used in research. However, specific cut-off values that differentiate "good" from "poor" sleep, have not been empirically-derived and its relationship to cardiometabolic health is less-well understood. We empirically-derived cut-off values for sleep health dimensions and examined the relationship between sleep health and cardiometabolic morbidity.

**METHODS:**

Participants from two independent Biomarker Studies in the MIDUS II (N = 432, 39.8% male, age = 56.92±11.45) and MIDUS Refresher (N = 268, 43.7% male, age = 51.68±12.70) cohorts completed a 1-week study where sleep was assessed with daily diaries and wrist actigraphy. Self-reported physician diagnoses, medication use, and blood values were used to calculate total cardiometabolic morbidity. Receiver operating characteristic (ROC) curves were generated in the MIDUS II cohort for each sleep health dimension to determine cut-off values. Using derived cut-off values, logistic regression was used to examine the relationship between sleep health scores and cardiometabolic morbidity in the MIDUS Refresher cohort, controlling for traditional risk factors.

**RESULTS:**

Empirically-derived sleep health cut-off values aligned reasonably well to cut-off values previously published in the sleep health literature and remained robust across physical and mental health outcomes. Better sleep health was significantly associated with a lower odds of cardiometabolic morbidity [OR(95% CI) =0.901(0.814-0.997), p = .044].

**CONCLUSIONS:**

These results contribute to the ongoing development of the sleep health model and add to the emerging research supporting a multidimensional perspective of sleep and health.

**14. HEADACHES****A nod to manual therapy and exercise**

Eur J Pain. 2019 Jul;23(6):1051-1070. doi: 10.1002/ejp.1374. Epub 2019 Feb 28.

**Non-pharmacological management of persistent headaches associated with neck pain: A clinical practice guideline from the Ontario protocol for traffic injury management (OPTiMa) collaboration.**

Côté P<sup>1,2,3</sup>, Yu H<sup>2,4</sup>, Shearer HM<sup>2,5</sup>, Randhawa K<sup>2,5</sup>, Wong JJ<sup>2,4,5</sup>, Mior S<sup>2,3,5</sup>, Ameis A<sup>3</sup>, Carroll LJ<sup>6</sup>, Nordin M<sup>7</sup>, Varatharajan S<sup>2,5</sup>, Sutton D<sup>2,5</sup>, Southerst D<sup>8</sup>, Jacobs C<sup>2,9</sup>, Stupar M<sup>2</sup>, Taylor-Vaisey A<sup>2</sup>, Gross DP<sup>10,11</sup>, Brison RJ<sup>12,13</sup>, Paulden M<sup>14</sup>, Ammendolia C<sup>15,16</sup>, Cassidy JD<sup>17,18</sup>, Loisel P<sup>5,19</sup>, Marshall S<sup>20</sup>, Bohay RN<sup>21</sup>, Stapleton J<sup>22</sup>, Lacerte M<sup>23,24</sup>.

**OBJECTIVES:**

To develop an evidence-based guideline for the non-pharmacological management of persistent headaches associated with neck pain (i.e., tension-type or cervicogenic).

**METHODS:**

This guideline is based on systematic reviews of high-quality studies. A multidisciplinary expert panel considered the evidence of clinical benefits, cost-effectiveness, societal and ethical values, and patient experiences when formulating recommendations. Target audience includes clinicians; target population is adults with persistent headaches associated with neck pain.

**RESULTS:**

When managing patients with headaches associated with neck pain, clinicians should (a) rule out major structural or other pathologies, or migraine as the cause of headaches; (b) classify headaches associated with neck pain as tension-type headache or cervicogenic headache once other sources of headache pathology has been ruled out; (c) provide care in partnership with the patient and involve the patient in care planning and decision making; (d) provide care in addition to structured patient education; (e) consider low-load endurance craniocervical and cervicospinal exercises for tension-type headaches (episodic or chronic) or cervicogenic headaches >3 months duration; (f) consider general exercise, multimodal care (spinal mobilization, craniocervical exercise and postural correction) or clinical massage for chronic tension-type headaches; (g) do not offer manipulation of the cervical spine as the sole form of treatment for episodic or chronic tension-type headaches; (h) consider manual therapy (manipulation with or without mobilization) to the cervical and thoracic spine for cervicogenic headaches >3 months duration. However, there is no added benefit in combining spinal manipulation, spinal mobilization and exercises; and (i) reassess the patient at every visit to assess outcomes and determine whether a referral is indicated.

**CONCLUSIONS:**

Our evidence-based guideline provides recommendations for the conservative management of persistent headaches associated with neck pain. The impact of the guideline in clinical practice requires validation.

**SIGNIFICANCE:**

Neck pain and headaches are very common comorbidities in the population. Tension-type and cervicogenic headaches can be treated effectively with specific exercises. Manual therapy can be considered as an adjunct therapy to exercise to treat patients with cervicogenic headaches. The management of tension-type and cervicogenic headaches should be patient-centred.

## 21. ADHESIVE CAPSULITIS

Both scapula mobilization and posterior capsule stretch helped.

J Musculoskelet Neuronal Interact. 2019 Sep 1;19(3):311-316.

### **Which method for frozen shoulder mobilization: manual posterior capsule stretching or scapular mobilization?**

Duzgun I<sup>1</sup>, Turgut E<sup>1</sup>, Eraslan L<sup>1</sup>, Elbasan B<sup>2</sup>, Oskay D<sup>2</sup>, Atay OA<sup>3</sup>.

#### *OBJECTIVES:*

This study aimed to compare the superiority of scapular mobilization, manual capsule stretching, and the combination of these two techniques in the treatment of frozen shoulder patients to evaluate the acute effects of these techniques on shoulder movements.

#### *METHODS:*

This study designed to a single-blinded, randomized, and pre-post assessment study. This study was included 54 patients diagnosed with stage 3 frozen shoulder. Group 1 (n=27) received scapular mobilization, and Group 2 (n=27) received manual posterior capsule stretching. After the patients were assessed, the interventions were re-applied with a crossover design to obtain results for the combined application (n=54). The range of motion, active total elevation, active internal rotation, and posterior capsule tensions of the shoulder joint were recorded before and immediately after mobilization.

#### *RESULTS:*

Statistical analysis showed an increase in all range of motion values ( $p < 0.05$ ), except for shoulder internal rotation ( $p > 0.05$ ), without significant difference among the groups ( $p > 0.05$ ). The posterior capsule flexibility did not change in any group ( $p > 0.05$ ).

#### *CONCLUSIONS:*

Scapular mobilization and manual posterior capsule interventions were effective in improving the acute joint range of motion in frozen shoulder patients

### 33. MENISCUS

#### Isokinetic exercise

Phys Ther Sport. 2019 Sep;39:120-125. doi: 10.1016/j.ptsp.2019.07.005. Epub 2019 Jul 18.

#### **Isokinetic eccentric training is more effective than constant load eccentric training on the quadriceps rehabilitation following partial meniscectomy: A randomized clinical trial.**

Vidmar MF<sup>1</sup>, Baroni BM<sup>2</sup>, Michelin AF<sup>3</sup>, Mezzomo M<sup>3</sup>, Lugokenski R<sup>3</sup>, Pimentel GL<sup>4</sup>, Silva MF<sup>2</sup>.

#### **OBJECTIVES:**

To compare the effects of conventional (constant load) eccentric training and isokinetic eccentric training on quadriceps muscle mass, strength and functionality of recreational athletes following partial meniscectomy.

#### **DESIGN:**

Randomized controlled trial.

#### **SETTING:**

XXXX, Brazil.

#### **PARTICIPANTS:**

32 recreational male athletes (~27 years old) who underwent partial meniscectomy performed a 6-week quadriceps strength training program in one of the experimental groups: conventional group (CG) or isokinetic group (IG).

#### **MAIN OUTCOME MEASURES:**

Quadriceps muscle mass, strength, and patients' objective and self-reported function.

#### **RESULTS:**

Both groups enhanced muscle mass, strength and functionality outcomes. The IG presented higher increases than CG for muscle mass (ES = 0.99-1.41), strength (ES = 1.48-2.35), and Lysholm score (ES = 1.0). The magnitude-based inference supports that results 'very likely' or 'almost certainly' favour IG compared to CG for all outcomes, except for the single leg hop test (i.e., between-group similar change).

#### **CONCLUSION:**

After partial meniscectomy, isokinetic eccentric training is more effective than conventional eccentric training to restore quadriceps muscle mass, strength, and functional capacity.

## 40. ANKLE SPRAINS AND INSTABILITY

### Poor guidelines for lateral ankle sprains

BMC Musculoskelet Disord. 2019; 20: 394. Published online 2019 Aug 31. doi: 10.1186/s12891-019-2750-6 PMCID: PMC6717337 PMID: 31470826

### What is the quality of clinical practice guidelines for the treatment of acute lateral ankle ligament sprains in adults? A systematic review

Toni Green,<sup>1,2</sup> Grant Willson,<sup>2</sup> Donna Martin,<sup>3</sup> and Kieran Fallon<sup>1</sup>

#### Background

Acute lateral ankle ligament sprains (LALS) are a common injury seen by many different clinicians. Knowledge translation advocates that clinicians use Clinical Practice Guidelines (CPGs) to aid clinical decision making and apply evidence-based treatment. The quality and consistency of recommendations from these CPGs are currently unknown. The aims of this systematic review are to find and critically appraise CPGs for the acute treatment of LALS in adults.

#### Methods

Several medical databases were searched. Two authors independently applied inclusion and exclusion criteria. The content of each CPG was critically appraised independently, by three authors, using the Appraisal of Guidelines for REsearch and Evaluation (AGREE II) instrument online version called My AGREE PLUS. Data related to recommendations for the treatment of acute LALS were abstracted independently by two reviewers.

#### Results

This study found CPGs for physicians and physical therapists (Netherlands), physical therapists, athletic trainers, physicians, and nurses (USA) and nurses (Canada and Australia). Seven CPGs underwent a full AGREE II critical appraisal. None of the CPGs scored highly in all domains. The lowest domain score was for domain 5, applicability (discussion of facilitators and barriers to application, provides advice for practical use, consideration of resource implications, and monitoring/auditing criteria) achieving an exceptionally low joint total score of 9% for all CPGs. The five most recent CPGs scored a zero for applicability. Other areas of weakness were in rigour of development and editorial independence.

#### Conclusions

The overall quality of the existing LALS CPGs is poor and majority are out of date. The interpretation of the evidence between the CPG development groups is clearly not consistent. Lack of consistent methodology of CPGs is a barrier to implementation.

**45 B. MANUAL THERAPY CERVICAL****Chemical changes in cervical manipulation**

J Man Manip Ther. 2019 Sep;27(4):186-196. doi: 10.1080/10669817.2018.1553696. Epub 2018 Dec 11.

**The immediate effects of cervical spine manipulation on pain and biochemical markers in females with acute non-specific mechanical neck pain: a randomized clinical trial.**

Lohman EB<sup>1</sup>, Pacheco GR<sup>1</sup>, Gharibvand L<sup>2</sup>, Daher N<sup>2</sup>, Devore K<sup>2</sup>, Bains G<sup>2</sup>, AlAmeri M<sup>1</sup>, Berk LS<sup>2,3</sup>.

**Study Design:** Randomized clinical trial with pre-test, post-test control group design.

**Objectives:** To examine the immediate effects of cervical spinal manipulation (CSM) on serum concentration of biochemical markers (oxytocin, neurotensin, orexin A, and cortisol).

**Background:** Several studies have found an association between spinal manipulation (SM) and pain perception. However, the mechanism by which SM modulates pain remains undefined.

**Methods:** Twenty-eight female subjects with non-specific mechanical neck pain were randomly assigned to one of two interventions (CSM versus sham CSM). Blood samples were drawn before and immediately after the respective interventions. Oxytocin, neurotensin, orexin A, and cortisol were measured from the blood and serum using the Milliplex Map Magnetic Bead Panel Immunoassay on the Luminex 200 Platform.

**Results:** In the CSM group, there were significant increases in pre- versus post-manipulation mean oxytocin ( $154.5 \pm 60.1$  vs.  $185.1 \pm 75.6$ ,  $p = .012$ ); neurotensin ( $116.0 \pm 26.5$  vs.  $136.4 \pm 34.1$ ,  $p < .001$ ); orexin A ( $52.2 \pm 31.1$  vs.  $73.8 \pm 38.8$ ,  $p < .01$ ) serum concentration; but no significant differences in mean cortisol ( $p = .052$ ) serum concentration. In the sham group, there were no significant differences in any of the biomarkers ( $p > .05$ ).

**Conclusion:** The results of the current study suggest that the mechanical stimuli provided through a CSM may modify neuropeptide expression by immediately increasing the serum concentration of nociception-related biomarkers (oxytocin, neurotensin, orexin A, but not cortisol) in the blood of female subjects with non-specific mechanical neck pain.

**KEYWORDS:** *Spinal manipulation; cortisol; neck pain; neurotensin; orexin A; oxytocin*  
PMID: 30935335 DOI: 10.1080/10669817.2018.1553696

**45 D. MANUAL THERAPY EXTREMITIES****Hip thrust improves Glut Max strength**

Musculoskelet Sci Pract. 2019 Aug 22;44:102051. doi: 10.1016/j.msksp.2019.102051. [

**The effect of a single high velocity low amplitude hip mobilization on strength in subjects with knee injuries.**

Silva Neto JB<sup>1</sup>, Ismania C<sup>1</sup>, de Freitas DG<sup>2</sup>, Cazarini C Jr<sup>2</sup>, Martin RL<sup>3</sup>, Fukuda TY<sup>4</sup>.

**BACKGROUND:**

Manual therapy have been used as a disinhibitory intervention to increase muscle activation before performing functional tasks that are limited by weakness. Knee injuries are commonly associated with weakness in quadriceps and gluteus. Currently, there is no evidence to support anecdotal experience that a hip distraction mobilization improves muscle performance in subjects with knee injuries and lower extremity weakness.

**OBJECTIVES:**

To determine if a hip distraction mobilization would result in an immediate change of maximal force output of the quadriceps and gluteus.

**DESIGN:**

Non-controlled observational pre-post design.

**METHODS:**

Forty individuals with knee pathology were included. Subjects underwent quadriceps, gluteus maximus, and gluteus medius muscle strength assessment before a single hip distraction of the symptomatic side. An immediate re-assessment of muscle strength of both symptomatic and asymptomatic sides followed the mobilization.

**RESULTS:**

/findings: Comparing pre-to post-mobilization strength on the symptomatic side, a significant increase was found with the gluteus maximus (average change = 2.0 kg [95%CI 0.6-3.4];  $p < 0.01$ ) but not gluteus medius (0.2 kg [-0.7-1.0];  $p = 0.71$ ) or quadriceps (0.1 kg [-1.4-1.7];  $p = 0.86$ ). When comparing the strength on the symptomatic side in subjects with weakness greater than the MDD<sub>95</sub> (0.7-2.9 kg), a significant increase was again found for gluteus maximus (4.7 kg [2.6-6.8];  $p < 0.01$ ) but not for gluteus medius (0.2 kg [-1.0-1.4];  $p = 0.71$ ) or quadriceps (1.6 kg [-0.7-3.9];  $p = 0.15$ ).

**CONCLUSION:**

A single hip distraction resulted in a significant increase in gluteus maximus strength but did not produce a change in gluteus medius or quadriceps strength in subjects with knee injuries.



**Mulligan helps knee OA pain**

Physiother Res Int. 2019 Sep 10:e1812. doi: 10.1002/pri.1812.

**Immediate effects of Mulligan's techniques on pain and functional mobility in individuals with knee osteoarthritis: A randomized control trial.**

Bhagat M<sup>1</sup>, Neelapala YVR<sup>1</sup>, Gangavelli R<sup>1</sup>.

**BACKGROUND AND PURPOSE:**

Mulligan's mobilization with movement was shown to be effective when implemented in multimodal therapy for knee osteoarthritis. However, no study has evaluated the Mulligan's technique in isolation and compared the relative effectiveness with sham-controlled interventions. Hence, the present study examined the immediate effects of Mulligan's techniques with sham mobilization on the numerical pain rating scale (NPRS) and timed up and go (TUG) test in individuals with knee osteoarthritis.

**METHODS:**

Thirty participants (mean age:  $55.3 \pm 8.3$  years) with symptoms at the knee and radiographic diagnosis of knee osteoarthritis were randomized into sham (n = 15) and intervention (n = 15) groups. The intervention (I) group received Mulligan's mobilization glides that resulted in relative pain relief for three sets of 10 repetitions. For the sham (S) group, the therapist's hand was placed over the joint surfaces mimicking the pain-relieving glides, without providing the gliding force. The outcome measures NPRS and TUG were recorded by a blinded assessor pre- and post-intervention.

**RESULTS:**

Statistically significant differences were identified between the groups in post-intervention median (interquartile range) NPRS (I group: 4.00 [2.00-5.00]; S group: 6.00 [4.00-7.00]) and TUG scores (I group: 10.9 [9.43-10.45]; S group: 13.18 [10.38-16.00]) with the intervention group demonstrating better outcomes ( $p < .05$ ). Within-group, the post-intervention scores of NPRS and TUG were significantly lower ( $p < .05$ ) compared to the pre-intervention scores in the intervention group. In the sham group, a statistically significant pre-post change was noticed only in the NPRS scores but not in the TUG scores.

**CONCLUSION:**

Mulligan's techniques were effective in improving pain and functional mobility in individuals with knee osteoarthritis. The underlying mechanisms for observed effects must be examined further, as participants reported pain relief following sham mobilization.

**46 B. LOWER LIMB NEUROMOBILIZATION****Sciatica and neural mobilization**

J Man Manip Ther. 2019 Sep;27(4):208-214. doi: 10.1080/10669817.2019.1580420. Epub 2019 Feb 26.

**Pragmatic neural tissue management improves short-term pain and disability in patients with sciatica: a single-arm clinical trial.**

Almeida RS<sup>1,2</sup>, Machado E<sup>3</sup>, Yamato TP<sup>4</sup>, Santos De Melo L<sup>5,6</sup>, Nogueira LAC<sup>2,7</sup>.

**Objectives:** To evaluate the clinical effect of sciatic neural mobilization in combination with the treatment of surrounding structures for sciatica patients. Secondly, we were also interested in identifying possible baseline characteristics that may be associated with improvements in pain and disability for sciatica patients.

**Methods:** Twenty-eight patients with a clinical diagnosis of sciatica were treated with neural mobilization, joint mobilization and soft tissue techniques. Pain intensity and lumbar disability were assessed at baseline and after treatment using a Numerical Rating Scale (0-10) and the Oswestry Disability Index (0-100), respectively. The pre- and post-intervention data were compared. The research protocol was registered under the number NCT03663842.

**Results:** Participants attended an average of 16 (SD±5.6) treatment<sup>[1]</sup> sessions over an average of 12 weeks. Decrease in pain scores (before median = 8, after median = 2;  $p < 0.001$ ) and improvement in lumbar disability scores (before median = 33.3%, after median = 15.6%;  $p < 0.001$ ) were observed. A multiple linear regression analysis showed that duration of pain and age of the patient predicted the disability improvement:  $F(2, 24) = 4.084$ ,  $p < 0.030$ ,  $R^2 = 0.254$ .

**Discussion:** Patients with sciatica may benefit from neural mobilization in combination with manual therapy for pain and lumbar disability. Longer pain duration and younger age had a negative influence on lumbar disability improvement.

**Adding neural mobilization to motor control program helps**

Am J Phys Med Rehabil. 2019 Sep 5. doi: 10.1097/PHM.0000000000001295

**Effects of Adding a Neurodynamic Mobilization to Motor Control Training in Patients with Lumbar Radiculopathy due to Disc Herniation: A Randomized Clinical Trial.**

Plaza-Manzano G<sup>1,2</sup>, Cancela-Cilleruelo I<sup>3</sup>, Fernández-de-Las-Peñas C<sup>4,5</sup>, Cleland JA<sup>6,7,8</sup>, Arias-Buría JL<sup>2,3</sup>, Thoomes-de Graaf M<sup>9</sup>, Ortega-Santiago R<sup>4,5</sup>.

**OBJECTIVE:**

To investigate the effects of the inclusion of neural mobilization into a motor control exercise program on pain, related-disability, neuropathic symptoms, straight leg raise (SLR), and pressure pain threshold (PPT) in lumbar radiculopathy.

**DESIGN:**

A randomized clinical trial.

**METHODS:**

Individuals with LBP, with confirmed disc herniation, and lumbar radiculopathy were randomly assigned to receive 8 sessions of either neurodynamic mobilization plus motor control exercises (n=16) or motor control exercises alone (n=16). Outcomes included pain, disability, neuropathic symptoms, SLR, and PPT at baseline, after 4 visits, after 8 visits, and after 2-months.

**RESULTS:**

There were no between-groups differences for pain, related-disability, or PPT at any follow-up period since both groups get similar and large improvements. Patients assigned to the neurodynamic program group experienced better improvements in neuropathic symptoms and the SLR compared to the motor control exercise group (P<0.01).

**CONCLUSION:**

The addition of neurodynamic mobilization to a motor control exercise program leads to reductions in neuropathic symptoms and mechanical sensitivity (SLR), but did not result in greater changes of pain, related-disability, or PPT over motor control exercises program alone in subjects with lumbar radiculopathy. Future trials are needed to further confirm these findings since between-groups differences did not reach clinically relevance.

**48 A. STM****Instrument assisted not validated**

Arch Phys Med Rehabil. 2019 Sep;100(9):1726-1751. doi: 10.1016/j.apmr.2019.01.017. Epub 2019 Feb 22.

**The Effectiveness of Instrument-Assisted Soft Tissue Mobilization in Athletes, Participants Without Extremity or Spinal Conditions, and Individuals with Upper Extremity, Lower Extremity, and Spinal Conditions: A Systematic Review.**

Nazari G<sup>1</sup>, Bobos P<sup>2</sup>, MacDermid JC<sup>3</sup>, Birmingham T<sup>2</sup>.

**OBJECTIVE:**

To assess the effectiveness of instrument-assisted soft tissue mobilization (IASTM) to other treatments or placebo in athletes or participants without extremity or spinal conditions and individuals with upper extremity, lower extremity, and spinal conditions.

**DATA SOURCES:**

The MEDLINE, EMBASE, CINAHL, and PEDro electronic databases were searched from January 1998 to March 2018.

**STUDY SELECTION:**

Randomized controlled trials of participants without extremity or spinal conditions or athletes and people with upper extremity, lower extremity, or spinal conditions, who received IASTM vs other active treatment, placebo, or control (no treatment), to improve outcome (function, pain, range of motion).

**DATA EXTRACTION:**

Two independent review authors extracted data, assessed the trials for risk of bias using the Cochrane Risk of Bias tool in included studies, and performed the rating of quality of individual trials per outcome across trials was also performed using the Grading of Recommendations, Assessment, Development, and Evaluations guidelines.

**DATA SYNTHESIS:**

Nine trials with 43 reported outcomes (function, pain, range of motion, grip strength), compared the addition of IASTM over other treatments vs other treatments. Six trials with 36 outcomes reported no clinically important differences in outcomes between the 2 groups. Two trials with 2 outcomes displayed clinically important differences favoring the other treatment (without IASTM) group. Six trials with 15 reported outcomes (pressure sensitivity, pain, range of motion, muscle performance), compared IASTM vs control (no treatment). Three trials with 5 outcomes reported no clinically important differences in outcomes between the 2 groups. Furthermore, in 1 trial with 5 outcomes, IASTM demonstrated small effects (standard mean difference range 0.03-0.24) in terms of improvement muscle performance in physically active individuals when compared to a no treatment group.

**CONCLUSION:**

The current evidence does not support the use of IASTM to improve pain, function, or range of motion in individuals without extremity or spinal conditions or those with varied pathologies.

**51. CFS/BET****Adding ergonomic training and motor control helps in the long term with cervical pain**

Eur J Pain. 2019 Jul;23(6):1141-1152. doi: 10.1002/ejp.1381. Epub 2019 Mar 11.

**Comparing the effectiveness of integrating ergonomics and motor control to conventional treatment for pain and functional recovery of work-related neck-shoulder pain: A randomized trial.**

Tsang SMH<sup>1</sup>, So BCL<sup>1</sup>, Lau RWL<sup>1,2</sup>, Dai J<sup>1</sup>, Szeto GPY<sup>1,2</sup>.

**BACKGROUND:**

Work-related neck and shoulder pain (WRNSP) is highly prevalent among patients who seek physiotherapy treatment. Clinicians may tend to focus on teaching home exercises and provide general advice about workplace improvement. The present study investigates the short- and long-term impact of an intervention approach that emphasizes on integrating the motor control re-education with ergonomic advice.

**METHODS:**

Participants diagnosed with WRNSP (n = 101) were randomly assigned into two groups in this randomized controlled trial. The Ergo-motor Group (EM, n = 51) received an integrated intervention with ergonomic advice/modifications and motor control training individualized for each participant based on their specific work demands. Control Group (CO, n = 50) received treatment for pain relief and general exercises of their necks at a designated physiotherapy clinic. Neck pain intensity and functional outcome measures were assessed before, immediately and 1-year after the 12-week intervention programmes. Global Rating of Change Score was used to evaluate the perceived recovery at 1-year follow-up.

**RESULTS:**

Both groups reported significant reductions in pain and functional disability scores at post-intervention (EM, n = 44; CO, n = 42) and 1-year follow-up (EM, n = 40; CO, n = 38); however, no significant between-group differences were found ( $p > 0.05$ ). Significantly higher rating in global recovery score was reported in EM group at 1-year follow-up ( $p < 0.05$ ).

**CONCLUSIONS:**

Intervention integrating ergonomic advice/modification with motor control exercise was found to be equally effective as pain relief and general exercise for pain and functional recovery. However, at 1-year follow-up, such integrated approach resulted in significantly better global recovery perceived by people with WRNSP.

**SIGNIFICANCE:**

Integrating ergonomic intervention and motor control training achieved similar reduction in pain and functional outcomes compared to conventional physiotherapy at post-intervention and at 1-year follow-up, for patients with moderate level of work-related neck-shoulder pain and mild degree of functional disability. The Ergo-motor Group reported significantly better perceived overall recovery at 1-year follow-up.

## 54. POSTURE

## Knee flexion contractures affect cervical posture

The Spine Journal

**Can Knee Flexion Contracture Affect Cervical Alignment and Neck Tension? A Prospective Self-Controlled Pilot Study**

Author links open overlay panel Yi Ding MD, PhD<sup>ab1</sup> Baoge Liu MD, PhD<sup>ab</sup> Hui Qiao PhD<sup>c</sup> Lu Yin MD<sup>d</sup> Wen He MD<sup>d</sup> Fang da Si<sup>ab</sup> Dian Wang<sup>ab</sup>  
<https://doi.org/10.1016/j.spinee.2019.09.008>

**Background Context** The coordination of the alignment between the lower extremities and cervical spine helps to achieve balance and horizontal gaze during standing and walking. Malalignment in any segment can disturb the global balance, causing compensation in another segment. Knee flexion contracture (KFC) can cause spine inclination with increased C7 tilt or C7 SVA (sagittal vertical axis). Cervical alignment and the posterior muscles are essential for maintaining the horizontal gaze which are closely related to neck tension (NT).

**Purpose** This study aimed to determine whether KFC can affect cervical alignment and its potential effects on the posterior muscles and NT.

**Design** A prospective pilot study was carried out in pre-operative (pre-op) and post-operative (post-op) phases.

**Patient Sample** This study included 22 consecutive patients with KFC and 12 control subjects in our department who agreed to participate from between August 1, 2018 to February 28, 2019 in our department. **Outcome Measures** Visual analog scale (VAS) and neck disability index (NDI) were used. The sagittal alignment parameters and cervical range of motion (ROM) were measured on radiographic images, and included the C0-C2 lordosis (C0-2L), C2-C7 lordosis (C2-7L), C2 SVA, C7 SVA, T1 slope (T1S), thoracic kyphosis (TK), lumbar lordosis (LL), pelvic tilt (PT), sacral slope (SS), and knee flexion angle (KA). Surface electromyography (sEMG)-based flexion-relaxation ratio (FRR) and ultrasound-based shear wave elastography (SWE) were performed.

**Methods** The control group was matched for age, sex, and BMI with the KFC group. Patients in the KFC group underwent arthroscopic surgery to correct knee alignment. Comparisons between pre-op and post-op phases were performed using paired sample *t*-tests, comparisons between KFC and control groups were performed using independent samples *t*-tests. The correlation analysis between the parameters was performed using Spearman analysis. Funding for this study was provided by the National Natural Science Foundation of China (60,000 USD), Beijing Municipal Administration of Hospitals Incubating Program (50,000 USD), and Beijing Municipal Administration of Hospitals Clinical Medicine Development of Special Funding Support (20,000 USD). There were no conflicts of interest associated with this study.

**Results** The average follow-up time for this pilot study was 11.4±1.5 days. Pre-op, the KFC group had higher KA, T1S, C7 SVA, C2 SVA, C0-2L, SWE, VAS, and NDI compared with the control group, but all of these parameters were decreased significantly post-op. The LL, FRR of splenius capitis (FRRsc), and ROM of the KFC group pre-op were lower than the control group, and all of these were increased significantly post-op. There were no differences in PT, SS, C2-7 L, or TK between the KFC and control groups, or in FRR of splenius capitis (FRRutr) between pre-op and post-op phases. KA had strong correlations with LL ( $r=-0.83$ ), which correlated well with C7 SVA ( $r=-0.75$ ). C7 SVA correlated strongly with C2 SVA ( $r=0.79$ ), which also correlated strongly with C0-2 L ( $r=0.76$ ). C0-2 L correlated well with FRRsc ( $r=-0.65$ ) and SWEsc ( $r=0.72$ ), and both of them correlated well with VAS ( $r=-0.54$ ,  $r=0.71$ ) and NDI ( $r=-0.57$ ,  $r=0.76$ ). ROM correlated well with FRRsc ( $r=0.71$ ), SWEsc ( $r=-0.74$ ), VAS ( $r=-0.66$ ), and NDI ( $r=-0.66$ ).

**Conclusions** KFC may cause spine inclination and cranio-cervical malalignment, leading to NT and ROM reduction. The results of this pilot study may be helpful in guiding further studies concerning KFC and NT.

## 55. SCOLIOSIS

### Rotations findings

Eur Spine J. 2019 Sep 11. doi: 10.1007/s00586-019-06138-3

#### **CT-based study of vertebral and intravertebral rotation in right thoracic adolescent idiopathic scoliosis.**

Brink RC<sup>1</sup>, Homans JF<sup>2</sup>, Schlösser TPC<sup>2</sup>, van Stralen M<sup>3</sup>, Vincken KL<sup>4</sup>, Shi L<sup>5</sup>, Chu WCW<sup>6</sup>, Viergever MA<sup>4</sup>, Castelein RM<sup>7</sup>, Cheng JCY<sup>8</sup>.

#### **PURPOSE:**

To define the longitudinal rotation axis around which individual vertebrae rotate, and to establish the various extra- and intravertebral rotation patterns in thoracic adolescent idiopathic scoliosis (AIS) patients, for better understanding of the 3D development of the rotational deformity.

#### **METHODS:**

Seventy high-resolution CT scans from an existing database of thoracic AIS patients (Cobb angle: 46°-109°) were included to determine the vertebral axial rotation, rotation radius, intravertebral axial rotation, and local mechanical torsion for each spinal level, using previously validated image processing techniques.

#### **RESULTS:**

For all levels, the longitudinal rotation axis, from which the vertebrae rotate away from the midline, was localized posterior to the spine. The axis became closer to the spine at the apex: apex,  $r = 11.5 \pm 5.1$  cm versus two levels above (radius =  $15.8 \pm 8.5$  cm;  $p < 0.001$ ) and beneath (radius =  $14.2 \pm 8.2$  cm;  $p < 0.001$ ). The vertebral axial rotation, intravertebral axial rotation, and local mechanical torsion of the vertebral bodies were largest at the apex ( $21.9^\circ \pm 7.4^\circ$ ,  $8.7^\circ \pm 13.5^\circ$  and  $3.0^\circ \pm 2.5^\circ$ ) and decreased toward the neutral, junctional zones ( $p < 0.001$ ).

#### **CONCLUSION:**

In AIS, the vertebrae rotate away around an axis that is localized posterior to the spine. The distance between this axis and the spine is minimal at the apex and increases gradually to the neutral zones. The vertebral axial rotation is accompanied by smaller amounts of intravertebral rotation and local mechanical torsion, which increases toward the apical region. The altered morphology and alignment are important for a better understanding of the 3D pathoanatomical development of AIS and better therapeutic planning for bracing and surgical intervention. These slides can be retrieved under Electronic Supplementary Material.

**56. ATHLETICS****Pitchers and limited hip int rot and shoulder pain****Restriction in the hip internal rotation of the stride leg is associated with elbow and shoulder pain in elite young baseball players**

Takuya Sekiguchi, MD, PhD<sup>a</sup> Yoshihiro Hagiwara, MD, PhD<sup>b,\*</sup>, Eiji Itoi, MD, PhD<sup>b</sup>

DOI: <https://doi.org/10.1016/j.jse.2019.07.004>

**Background**

Evidence is scarce concerning the relationship of physical dysfunction of the trunk and lower extremities with elbow and shoulder pain in young baseball players. This study aimed to examine the association of joint flexibility of the trunk and lower extremities and dynamic postural control with elbow and shoulder pain among elite young baseball players.

**Methods**

We analyzed baseball players (aged 9-12 years) who participated in the National Junior Sports Clubs Baseball Festival. Range of motion in external rotation and internal rotation (IR) of the hip, as well as the finger-to-floor distance and heel-to-buttock distance, was measured. The straight-leg-raise test was also conducted. Dynamic postural control was evaluated using the Star Excursion Balance Test. Multivariable logistic regression analyses were conducted to examine the association of physical function with the elbow or shoulder pain incidence.

**Results**

Of 210 players surveyed, 177 without elbow or shoulder pain were included in the analysis. Of the participants, 16 (9.0%) reported having elbow or shoulder pain during the tournament. Participants with the incidence of elbow or shoulder pain had a significant restriction in hip IR of the stride leg compared with those without pain (35.8° vs. 43.7°,  $P = .022$ ). There were no significant associations of other joint flexibilities and the Star Excursion Balance Test with elbow or shoulder pain.

**Conclusion**

Decreased hip IR range of motion of the stride leg was significantly associated with the elbow or shoulder pain incidence. Players, coaches, and clinicians should consider the physical function of the trunk and lower extremities for the prevention of elbow and shoulder pain.



**Sport specific ex helps**

PLoS One. 2019; 14(8): e0221346. Published online 2019 Aug 29. doi: 10.1371/journal.pone.0221346 PMID: 31465458

**General versus sports-specific injury prevention programs in athletes: A systematic review on the effects on performance**

Ashley Plummer,

**Introduction**

Injury prevention programs (IPPs) are an inherent part of training in recreational and professional sports. Providing performance-enhancing benefits in addition to injury prevention may help adjust coaches and athletes' attitudes towards implementation of injury prevention into daily routine. Conventional thinking by players and coaches alike seems to suggest that IPPs need to be specific to one's sport to allow for performance enhancement. The systematic literature review aims to firstly determine the IPPs nature of exercises and whether they are specific to the sport or based on general conditioning. Secondly, can they demonstrate whether general, sports-specific or even mixed IPPs improve key performance indicators with the aim to better facilitate long-term implementation of these programs?

**Methods**

PubMed and Web of Science were electronically searched throughout March 2018. The inclusion criteria were randomized control trials, publication dates between Jan 2006 and Feb 2018, athletes (11–45 years), injury prevention programs and included predefined performance measures that could be categorized into balance, power, strength, speed/agility and endurance. The methodological quality of included articles was assessed with the Cochrane Collaboration assessment tools.

**Results**

Of 6619 initial findings, 22 studies met the inclusion criteria. In addition, reference lists unearthed a further 6 studies, making a total of 28. Nine studies used sports specific IPPs, eleven general and eight mixed prevention strategies. Overall, general programs ranged from 29–57% in their effectiveness across performance outcomes. Mixed IPPs improved in 80% balance outcomes but only 20–44% in others. Sports-specific programs led to larger

**Conclusion**




Sports-specific IPPs have the strongest influence on most performance indices based on the significant improvement versus control groups. Other factors such as intensity, technical execution and compliance should be accounted for in future investigations in addition to exercise modality.

**Nordic hamstring training helps**

Annals of Rehabilitation Medicine 2019;43(4):465-473.

OI: <https://doi.org/10.5535/arm.2019.43.4.465>

**Effect of Pre-training and Post-training Nordic Exercise on Hamstring Injury Prevention, Recurrence, and Severity in Soccer Players**

Ahmed Ebrahim Elerian, MD, PhD<sup>1</sup> , Mohsen M. El-Sayyad, MD, PhD<sup>1</sup> , Hend Adel Abdelhalim Dorgham, BS<sup>2</sup> 

To investigate the effect of adding Nordic exercise as post-training in decreasing hamstring initial, recurrent injuries rates, and their severity.

**Methods**

In this randomly controlled trial study, 34 professional football players aged 21 to 35 years were randomly assigned into two groups (17 players each) from Sporting clubs at Alexandria, Egypt. For group one, Nordic hamstring exercise (NHE) was performed pre-training and post-training. For group two, NHE was only performed pre-training. The control group was the same team during the previous season. Length of the trial was 12 weeks. The Australian football association injury form was used to collect incidence of injuries for each subject in both groups.

**Results**

Pooled results based on total injuries showed that group one had significantly less hamstring initial injuries (92% less) than the previous season, while group two had 80% less initial injuries and 85% less recurrent injuries than previous season. Regarding the severity of injuries in term of mean number of absent days, it was 1 day for group one and 2.7 days for group two while it was 7.95 days for the previous season during total risk time of  $116.3 \pm 13.2$  and  $117.6 \pm 5.7$  exposure hours for group one and group two, respectively.

**Conclusion**

The use of NHE as a prevention protocol was effective in reducing all hamstring injuries with the use of NHE during pre-training and post-training having the greatest effect.

**61. FIBROMYALGIA****Small fiber skin fibers pathology enhances pain**

Ann Neurol. 2019 Oct;86(4):504-516. doi: 10.1002/ana.25565. Epub 2019 Aug 21.

**Reduction of skin innervation is associated with a severe fibromyalgia phenotype.**

Evdokimov D<sup>1</sup>, Frank J<sup>1</sup>, Klitsch A<sup>1</sup>, Unterecker S<sup>2</sup>, Warrings B<sup>2</sup>, Serra J<sup>3</sup>, Papagianni A<sup>1</sup>, Saffer N<sup>1</sup>, Meyer Zu Altenschildesche C<sup>1</sup>, Kampik D<sup>4</sup>, Malik RA<sup>5</sup>, Sommer C<sup>1</sup>, Üçeyler N<sup>1</sup>.

**OBJECTIVE:**

To assess patterns and impact of small nerve fiber dysfunction and pathology in patients with fibromyalgia syndrome (FMS).

**METHODS:**

One hundred seventeen women with FMS underwent neurological examination, questionnaire assessment, neurophysiology assessment, and small fiber tests: skin punch biopsy, corneal confocal microscopy, microneurography, quantitative sensory testing including C-tactile afferents, and pain-related evoked potentials. Data were compared with those of women with major depressive disorder and chronic widespread pain (MD-P) and healthy women.

**RESULTS:**

Intraepidermal nerve fiber density (IENFD) was reduced at different biopsy sites in 63% of FMS patients (MD-P: 10%, controls: 18%;  $p < 0.001$  for each). We found 4 patterns of skin innervation in FMS: normal, distally reduced, proximally reduced, and both distally and proximally reduced ( $p < 0.01$  for each compared to controls). Microneurography revealed initial activity-dependent acceleration of conduction velocity upon low frequencies of stimulation in 1A fibers, besides 1B fiber spontaneous activity and mechanical sensitization in FMS patients. FMS patients had elevated warm detection thresholds ( $p < 0.01$ ), impaired C-tactile afferents ( $p < 0.05$ ), and reduced amplitudes ( $p < 0.001$ ) of pain-related evoked potentials compared to controls. Compared to FMS patients with normal skin innervation, those with generalized IENFD reduction had higher pain intensity and impairment due to pain, higher disease burden, more stabbing pain and paresthesias, and more anxiety ( $p < 0.05$  for each). FMS patients with generalized IENFD reduction also had lower corneal nerve fiber density ( $p < 0.01$ ) and length ( $p < 0.05$ ).

**INTERPRETATION:**

The extent of small fiber pathology is related to symptom severity in FMS. This knowledge may have implications for the diagnostic classification and treatment of patients with FMS. ANN NEUROL 2019;86:504-516.