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AEROBIC TRAINING AND PAIN TOLERANCE

A number of studies have demonstrated pain relieving effects of exercise training in patients with chronic disease. However, few have examined the effect of chronic aerobic exercise on pain sensitivity in healthy participants. This study examined the effects of moderate to vigorous intensity aerobic exercise on pain sensitivity in healthy adults.

Healthy adults, between the ages of 18 and 50 years with no history of chronic pain or chronic disease were recruited. The patients were allocated to an exercise group or to a control group. At baseline and follow-up, both groups were assessed for pain sensitivity and aerobic capacity, with questionnaires assessing psychological status and physical activity levels. Pressure pain thresholds and ischemic pain tolerance were also assessed. The exercise group worked with a cycle ergometer three times per week for 30 minutes at 75% of HR reserve. Control subjects performed only the initial and final assessments, and were asked to maintain their regular levels of physical activity.

At follow-up, a significant increase was seen in ischemic pain tolerance in the exercise group ($p=0.036$), with this tolerance not significantly changed in the control group. For pain ratings during ischemia, and for pressure pain thresholds, no group effect or group-time interaction was found.

Conclusion: This study suggests that six weeks of moderate to vigorous aerobic exercise training can increase pain tolerance to noxious ischemic stimuli in healthy individuals.

Jones, M., et al. Aerobic Training Increases Pain Tolerance in Healthy Individuals. *Med Sci Sport Exer.* 2014, August; 46(8): 1640-1647.

ANKLE FRACTURES AND COMPRESSION STOCKINGS

Ankle fractures are common, with treatment including operative or nonoperative intervention. While compression stockings have been found to reduce the risk of venous stasis and deep venous thrombosis, some have suggested that these stockings may also improve wound healing. This study evaluated the effect of compression on recovery following ankle fracture.

This single center, prospective, randomized trial included patients 16 to 90 years of age with an acute ankle fracture. The subjects were randomized to receive either compression, using ankle injury stockings (AIS) plus an air cast boot, or a Tubigrip plus an air cast boot. The pressure profiles for the ankle injury stockings were 25 mmHg at the ankle, 17 mmHg at the midcalf and 10 mmHg at the upper calf. The primary outcome measure was the Olerud-Molander Ankle Score (OMAS). Secondary outcome measures included Short Form (SF)- 12v2 Quality of Life questionnaires, frequency of deep venous thrombosis and the American Orthopedic Foot and Ankle Society Score (AOFAS).

The mean OMAS score was significantly better for patients treated with AIS, than for the control group at all time points ($p<0.001$). At six months, a marked difference remained in OMAS scores, with those in the treatment group obtaining a mean score of 98, as compared to 67 in the control group ($p<0.001$). The mean AOFAS scores and the SF quality of life scores were also significantly better in the treatment group than in the control group. At four weeks, of the 86 with duplex imaging, five (12%) of 43 in the AIS group, and ten (23%) of 43 in the Tubigrip group developed a DVT ($p = 0.26$).

Conclusion: This randomized, single-blind, controlled study found

that compression stockings can improve functional outcome and quality-of-life for patients with ankle fractures.

Sultan, M., et al. Compression Stockings in the Management of Fractures of the Ankle. *Bone Joint J.* 2014; 96-B: 1062-1069.

BOTULINUM TOXIN AT MOTOR ENDPLATE FOR CERVICAL DYSTONIA

Cervical dystonia, the most common form of primary focal dystonia, is characterized by involuntary contraction of cervical muscles, leading to abnormal movements and postures of the head and neck. Treatment strategies include intramuscular injections with botulinum toxin. This study was designed to determine whether injections to the muscle's motor endplate zone (MEZ) might enhance the effect of the botulinum toxin injections.

Eighteen patients with cervical dystonia were studied. In all patients, botulinum toxin injections were placed in the sternocleidomastoid (SCM) and the splenius capitus (SC) muscle, injected every two to four onths. In study one, high density surface electromyography was used to locate the MEZ. In study two, patients were injected at the MEZ, receiving half of their regular botulinum toxin dose at the endplate zone or their regular doses at the standard injection site. Dystonia severity was recorded before and four weeks after each treatment session, using the Western Spasmodic Torticollis Rating Scale Severity subscore.

In the first study, the MEZ was localized in two thirds of the muscles. In the second study, both the standard approach and the reduced dose at the MEZ resulted in objective improvement of dystonia, with no significant difference between the two groups.

Conclusion: This study found that injecting Botulinum toxin at the

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motor endplate zone can allow for significantly less botulinum toxin injected, as compared to the standard approach.

Delnooz, C., et al The Clinical Utility of Botulinum Toxin Injections Targeted at the Motor Endplate Zone in Cervical Dystonia. **Euro J Neurol.** 2014;21DOI.1111/ene.12517

CERVICOVESTIBULAR REHABILITATION IN SPORTS CONCUSSION

After concussion, dizziness and balance dysfunction are commonly reported. This finding may be due to dysfunction of the vestibular proprioceptive or central systems. This study was designed to determine whether the combination of vestibular rehabilitation and physiotherapy improves outcomes for patients with prolonged postconcussive symptoms of dizziness, neck pain or headaches. Patients between the ages of 12 and 30 years of age, all diagnosed with sports related concussion and symptoms greater than 10 days in duration, were studied. All complained of dizziness, neck pain and/or headaches.

The patients were randomized to an intervention or control group, both seen weekly for eight weeks by a physiotherapist. An intervention group received a combination of cervical spine physiotherapy, and vestibular rehabilitation. The primary outcome measure was the number of days from treatment initiation until medical clearance to return to sport.

A total of 31 individuals were studied. A greater proportion of individuals in

the treatment group were medically cleared to return to sport at eight weeks than within the control group (73% and 7% respectively). Intention to treat analysis revealed that more individuals in the treatment group were medically cleared to return to sport than in the control group (p=0.002).

Conclusion: This study of young athletes with sport related concussion symptoms of dizziness, neck pain and/or headaches, found that the combination of cervical and vestibular therapy can decrease the time to medical clearance to return to sport.

Schneider, K., et al. Cervicovestibular Rehabilitation and Sports Related Concussion: A Randomized, Controlled Trial. **Br J Sport Med.** 2014, September; 48 (17): 1294-1298

COGNITIVE IMPAIRMENT IN HIP FRACTURE PATIENTS

Cognitive impairment (CI) is a known risk factor for falls in the elderly. Hip fractures are often associated with decreases in independence, mobility and overall daily function. It is difficult to estimate the underlying frequency of preoperative cognitive disorders in this population. Rates of documented dementia in hip fracture patients have varied from 15% to 32%. This study was designed to determine the prevalence of preoperative cognitive impairment in patients with hip fractures.

Data were obtained from an ongoing, prospective, longitudinal study of cognitive assessment after hip fractures in the elderly (CAFE). Subjects were 65 years of age or older, admitted for acute hip fracture between August of 2011 and August of 2012. Delirium was assessed with the Confusion Assessment Method Short- Form (CAM-SF) and documented by the attending physician. The Montréal Cognitive Assessment (MoCA) was used for preoperative cognitive assessment and to determine the presence and severity of CI. Patients were also assessed for anxiety, fear and pain.

A total of 62 patients with hip fracture were studied. Of these, 37% scored in the normal range of cognition and 62.9% scored in the CI range. Only five patients had a documented diagnosis of CI or dementia during hospitalization. Before hip fracture, 46.2% of the cognitively impaired and 43.5% of the cognitively normal patients lived

alone. While median preoperative pain scores were higher in those with CI (p<0.001), no significant differences in fear or anxiety were found between the groups.

Conclusion: This study of elderly patients with hip fractures found that cognitive impairment is highly prevalent, but often unrecognized, during hospitalization.

Daniels, A., et al. Preoperative Cognitive Impairment and Psychological Distress in Hospitalized, Elderly Hip Fracture Patients. **Am J Orthopedics.** 2014, July; 43(7): E146-E152.

PROPHYLACTIC INDOMETHACIN AFTER ACETABULAR FRACTURE REPAIR

While indomethacin has long been thought to be a prophylactic agent against HO, the literature concerning its use in clinical practice contains mixed results. This study further evaluated the relationships among indomethacin prophylaxis, the incidence of HO and bone healing following acetabular fracture.

This randomized, double-blind, controlled trial included 98 patients with acute acetabular fractures, managed surgically. The subjects were randomly assigned to six weeks of treatment with 1) placebo for six weeks, 2) three days of indomethacin, followed by a placebo, 3) one week of indomethacin followed by placebo or 4) six weeks of indomethacin. The participants were assessed for range of motion, pain and radiographic changes at six weeks, and at three, six and twelve months.

At six-month follow-up, the incidence of HO in group one was 67%, while that in group four was 69%. Those in group four had a higher rate of nonunion than group one (p=0.012). Subjects in group three had a lower incidence and volume of HO, as compared to group one, without increased nonunion.

Conclusion: This study of patients undergoing acetabular fracture repair found that prolonged prophylaxis with indomethacin does not decrease the incidence of HO but does increase the risk for fracture nonunion. However, indomethacin treatment for one week was effective in decreasing HO, without the additional risk of nonunion.

Sagi, H., et al. Indomethacin Prophylaxis for Heterotopic Ossification after Acetabular Fracture Surgery Increases the Risk for

Nonunion of the Posterior Wall. *J Ortho Trauma*. 2014, July; 28 (7):377-383.

EFFECTS OF IBUPROFEN ON TENDON HEALING ARE TIME DEPENDENT

Clinical protocols after tendon repair often include nonsteroidal anti-inflammatory drugs (NSAIDs) to reduce pain and inflammation. While this class of medication has been found to have negative effects on tendon cell migration and proliferation, some studies have also suggested that a late application may improve the healing process. This study investigated tendon healing based upon timing of administration of ibuprofen.

This animal study included 65 rats undergoing bilateral supraspinatus detachment and repair surgeries. The subjects were divided into a control group, a group administered ibuprofen on days zero to seven, and a group administered ibuprofen on days 7-14. The rats were euthanized, with issues examined biomechanically and histologically at days seven, 14 and 28.

Tendon stiffness and modulus of elasticity were significantly worse in the early group as compared to the control group ($p=0.003$ and $p=0.013$, respectively). No significant difference was seen between the control and the late delivery group. The early ibuprofen group demonstrated significantly lower fiber alignment at seven days ($p=0.0084$), suggesting reduced fiber reorganization as compared with that of controls.

Conclusion: This animal study of tendon surgical repair suggests that early, but not late, administration of ibuprofen has a negative effect on tendon healing.

Connizzo, B., et al. The Detrimental Effects of a Systematic Ibuprofen Delivery on Tendon Healing Are Time Dependent. *Clin Ortho Related Research*. 2014, August; 472 (8):24332439.

EARLY BOTULINUM TOXIN FOR SPASTIC PES EQUINOVARUS

Botulinum toxin has been shown to be effective for the treatment of tone related to upper motor neuron lesions. This study was designed to better understand the effect of the timing of botulinum toxin therapy for lower limb spasticity. This single center, randomized,

placebo-controlled trial included patients with traumatic brain injury (TBI), diffuse cerebral hypoxia or stroke. All patients presenting with unilateral or bilateral spastic pes equinovarus were randomized to receive either a botulinum toxin injection or a placebo injection. Those in the botulinum group received 230 units of Botulinum toxin A (Botox), injected into the gastrocnemius, the soleus and the tibialis posterior. Those with bilateral involvement received the same injections in both legs. Both groups received similar, standardized, multidisciplinary neuro-rehabilitative care and physiotherapy following the injections. At week 12, both groups were given the opportunity for repeat injections. The main outcome variable was the modified Ashworth scale (mAS). Patients in the treatment group demonstrated significant improvement on the mAS, from an average of 3.3 at baseline to 2.7 at week 12 ($p<0.01$). At week 12, spastic muscle tone differed significantly between the two treatment groups (2.7 (Botox) vs. 3.2 (placebo); $p < 0.01$). The placebo group deteriorated, with mAS scores of 3.1 at week 0, to 4.2 at week 16, and to 4.6 at week 36. Deterioration occurred even among those offered Botox at 12 weeks.

Conclusion: This study found, that among patients with central nervous system injuries, those treated with botulinum toxin within four weeks of injury enjoy significant improvement in spastic pes equinovarus, as compared with those treated after three months.

Fietzek, U., et al. Early Botulinum Toxin Treatment for Spastic Pes Equinovarus: A Randomized, Double-Blind, Placebo-Controlled Study. *Euro J Neurol*. 2014, August; 21(8): 1089-1095.

COMPARING WEIGHT LOSS AMONG NAMED DIET PROGRAMS

Named or branded weight loss programs are available to the general public, and represent a multibillion dollar industry. This meta-analysis reviewed the available literature concerning the relative efficacy of these programs.

This study reviewed six electronic databases for randomized, controlled trials which assigned overweight or obese individuals to a popular brand diet or alternative, with at least a three-month follow-up. The primary outcome variables were weight loss at six and 12 months' follow-up.

Secondary outcomes included body mass index (BMI) and adverse events.

Identified were 48, randomized, controlled trials, including 7,286 individuals with a median age of 45.7 years and a median BMI of 33.7 kg/m². Moderate macronutrient and low carbohydrate diets were the most common diet classes. The diet classes of low fat and low carbohydrate had the largest estimated treatment effects. Among those, Weight Watchers, Atkins, and Zone had the most comparisons. Compared with no diet, low carbohydrate diets had a median difference in weight loss of 8.73 kg, similar to that in low fat diets (7.99 kg).

Conclusion: This meta-analysis of popular diets found that low carbohydrate and low-fat dietary programs were associated with more weight loss than other diets. The weight loss differences among individual named diets were small.

Johnston, B., et al. Comparison of Weight Loss among Named Diet Programs in Overweight and Obese Adults. A Meta-Analysis. *JAMA*. 2014, Sept 3; 312(9): 923-933.

METABOLIC SYNDROME AND CAFFEINATED BEVERAGES

The metabolic syndrome is a common affliction characterized by a constellation of metabolic disorders, identified as risk factors for developing cardiovascular disease. Several studies have suggested health benefits of both coffee and tea, although the mechanisms of these effects remain unclear. This Italian Study was designed to evaluate whether caffeinated beverages are associated with the metabolic syndrome.

Between May of 2009 and December of 2010, 3,254 inhabitants of a southern Italian city were invited to enroll in this study. The participants received a survey regarding basic demographic information, tobacco and alcohol intake and dietary information. The dietary data included questions about caffeinated beverages, with total caffeine intake calculated by the study staff. Weight and height, waist circumference, blood pressure, blood lipids and fasting plasma glucose levels were recorded. The data were reviewed to determine whether the consumption of caffeinated beverages is associated with components of the metabolic syndrome.

Roughly one third of the population consumed daily tea, and one half consumed daily coffee. Coffee and tea consumption were both associated with a significant reduction in the number of components of the metabolic syndrome, and with reduced prevalence of the metabolic syndrome ($p < 0.05$ for both comparisons). Other beverages containing caffeine had no such association.

Conclusion: This study found that coffee and tea consumption are associated with a significant reduction in the number of components of, and reduced prevalence of, the metabolic syndrome.

Grosso, G., et al. Factors Associated with Metabolic Syndrome in a Mediterranean Population: The Role of Caffeinated Beverages. *J Epidemiol.* 2014; 24(4): 327-333.

LEISURE TIME RUNNING REDUCES ALL CAUSE AND CARDIOVASCULAR MORTALITY RISK

The World Health Organization and the United States government have released evidence-based physical activity guidelines recommending at least 150 minutes of moderate intensity, or 75 minutes of vigorous intensity, aerobic activity per week. This study was designed to determine whether leisure time running is associated with all cause and cardiovascular disease mortality risks, and whether a dose response relationship exists between running and mortality.

Subjects were men and women 18 to 100 years of age at baseline. All participants underwent a physical activity questionnaire, including four questions about running duration, distance, frequency and speed. The subjects were assigned to one of six groups, including non-runners and five groups of runners, divided by weekly running time, distance, frequency, amount and speed. The participants were followed for mortality from the baseline examination through the date of death, or until study completion.

A sample of 55,137 individuals was available for analysis for all-cause mortality, and 52,941 for analysis of cardiovascular disease mortality. There were 3,413 all-cause deaths and 1217 cardiovascular deaths during the follow-up period, averaging 14.6 years. Compared with non-runners, runners had 30% and 45% lower risks of all-cause and cardiovascular disease mortality, respectively, after adjusting for

potential confounders. Runners across all five quintiles of weekly running time, even those with less than 50 minutes per week, had lower risks of all-cause and cardiovascular disease mortality than did non-runners. These mortality benefits were similar between lower and higher doses of weekly running time.

Conclusion: This study found that running, even five to 10 minutes per day at slow speeds, is associated with a markedly reduced risk of death from all causes and cardiovascular disease.

Lee, D., et al. Leisure Time Running Reduces All Cause and Cardiovascular Mortality Risk. *J Amer College of Cardiol.* 2014, August; 64(5): 472-481.

LOW INJURY AND HIGH BENEFIT WITH GRAVITATIONAL WEIGHT LIFTING

Among considerations in weightlifting are the weights lifted and the number of repetitions. Previous studies of the Gravitational Weight Lifting program have demonstrated that middle-aged individuals could lift over 1,000 pounds of free weight in a single lift after 10 weeks of training. This study was designed to determine the benefit to risk ratio among those participating.

Data were obtained concerning 77 consecutive individuals seen at a Gravitational Wellness center over a period of two years. Participants lifted free weights 20 minutes per session, 2-4 times per month. The protocol involved four stations of free weights, including a belt lift, hand lift, chest press and leg press. Participants were contacted by telephone and asked whether they had a physical condition that they had hoped to improve by the weightlifting. Using a five point Likert scale participants rated the degree that the weight lifting program had improved their presenting complaint as well as how well it had improved their overall subjective health.

The 71 subjects who had agreed to participate had a mean age of 48.6 years. The average weights achieved after a median of 21, 20-minute sessions were 505.69 kg (1110 lbs.) for the belt lift, 181.04 kg (399.1 lbs.) for the hand lift, 138.81 kg (306 lbs.) for the chest press and 390.46 kg (861 lbs.) for the leg press. The modal complaint at presentation was back pain. Patients improved by an average of 4.2 on a five point Likert scale for their presenting complaints, and 4.275 in overall wellbeing. No

injuries were reported during the weightlifting.

Conclusion: This study of middle aged individuals involved in a free weight lifting program found that, after 21 training sessions, the mean weight lifted was over 1,000 pounds. Subjects reported significant improvements in musculoskeletal complaints and overall well-being.

Burke, D., et al. Rate of Injury and Subjective Benefits of Gravitational Wellness Weightlifting. *Open Access J Sports Med.* 2014;5:215-221.

LOW-CARBOHYDRATE VERSUS LOW-FAT DIETS

Over one third of all American adults have one form of cardiovascular disease, and one third of total deaths are due to cardiovascular disease. This study examined the effects of a 12-month low carbohydrate diet, as compared with a low-fat diet, on body weight and cardiovascular disease risk factors.

This study included 146 adults, 22 to 75 years of age all with a body mass index of 30 to 45 kg/m². The subjects were randomized to receive either a low-fat diet [30% of daily energy from total fat (<7% saturated fat) and 55% from carbohydrate] or a low carbohydrate diet (digestible carbohydrate restricted to 40 g per day). Neither diet included specific calorie or energy goals. Anthropomorphic measures, blood pressure as well as blood and urine samples were taken at all visits.

At 12 months, the decrease in body weight was significantly greater in the carbohydrate group ($p = 0.002$). The low carbohydrate diet group had significantly greater reductions in fat mass and increases in lean mass at 12 months than did the low-fat diet group ($p = 0.003$). Those in the low carbohydrate diet had a better ratio

of total-high-density lipoprotein (HDL) cholesterol ($p = 0.002$), triglyceride levels ($p = 0.038$) and greater increases in HDL cholesterol level ($p < 0.001$) than did those on the low-fat diet. Participants in the low carbohydrate group had significant decreases in the estimated 10-year risk factor for CHD at six and 12 months, while those in the low-fat group did not.

Conclusion: This study, comparing low carbohydrate and low-fat diets, found that the low carbohydrate diet is more effective for weight loss and cardiovascular disease risk factor reductions than the low-fat diet.

Bazzano, L., et al. Effects of Low Carbohydrate and Low-Fat Diets. A Randomized Trial. *Ann Intern Med.* 2014, Sept 2; 161(5): 309-318.

NOVEL COMPRESSION GARMENT IMPROVES SPRINT PERFORMANCE

Some studies have suggested that lower body garments that exert compression likely have ergogenic effects during sprinting. As taping is also thought to improve strength and power, this study was designed to determine whether a compression garment, combined with adhesive silicone stripes (CGSS), helps improve athletic performance.

This study included 24 female subjects recruited from track and field or team sports clubs. The athletes were randomized to participate in sub-study one or sub-study two. Those assigned to sub-study one carried out two sessions of 30, 30 m repeated sprints, one wearing the CGSS and the other with non-compression tights without any adhesive silicone stripes.

The women wore a portable telemetric metabolic cart, a chest belt that monitored heart rate and a portable near infrared spectroscope. In sub-study two, the same procedure was followed, with the subjects wearing a telemetric device to record muscle activation, and with motion captured by video-analysis.

In sub-study one, sprint time was improved during the final third of the protocol among those wearing the CGSS ($p=0.02$). During the final 10 sprints, use of the CGSS garment reduced the perceived rate of exertion in the upper leg muscles ($p=0.01$). In sub-study two, sprint times were again improved in the final third of the protocol among those wearing the study garment ($p<0.01$). Motion analysis revealed that wearing the garment significantly reduced the hip flexion angle. During the final 10 sprints, the CGSS group increased step length, without altering step frequency, and demonstrated enhanced EMG activity in the rectus femoris muscle ($p=0.01$).

Conclusion: This study of female athletes found that the use of a compression garment with adhesive silicone stripes can improve repeated sprint performance, reducing perceived fatigue and altering running technique.

Born, D., et al. A Novel Compression Garment with Adhesive Silicone Stripes Improves Repeated Sprint

Performance: A Multi-Experimental Approach on the Underlying Mechanisms. *BMC Sports Science Med Rehabil.* 2014; 6: 21.

METABOLIC SYNDROME AND CAFFEINATED BEVERAGES

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PREOPERATIVE PSYCHOLOGICAL DISTRESS AND OUTCOMES AFTER TOTAL KNEE ARTHROPLASTY

Up to 30% of patients report no improvement in pain and function after

total knee arthroplasty. This study was designed to determine whether preoperative psychological distress levels can predict poor outcomes among these patients.

This prospective cohort study included patients undergoing unilateral, primary total knee arthroplasty as a treatment for gonarthrosis. Of the patients recruited, 235 underwent surgery and 28 were placed in a control group, as they did not want surgery or had medical contraindications to surgery. At baseline, all patients completed the Full-Screen Mini Mental Test, the Hospital Anxiety and Depression Scale, the Knee Society Score (KSS), a Visual Analogue Scale for Pain and the WOMAC Quality-of-Life Questionnaire. The patients were divided into those with versus without psychological distress.

Psychological distress decreased from 34.16% before surgery to 7.9% at one year. Those experiencing preoperative psychological distress obtained poorer KSS scores in function ($p=0.002$) and quality of life ($p=0.042$) one year after surgery.

Conclusion: This study of patients undergoing total knee arthroplasty found that changes in function and quality of life were worse at one year among patients with preoperative psychological distress.

Utrillas-Compaired, A., et al. Does Preoperative Psychological Distress Influence Pain, Function, and Quality-of-Life after TKA? *Clin Ortho Related Research.* 2014, August; 472 (8):2457-2465.

READMISSION AFTER TOTAL HIP ARTHROPLASTY

As the second phase of the Patient Protection and Affordable Care Act of 2010 takes effect, hip arthroplasty will be included in a readmission policy that imposes financial penalties on hospitals for excess readmission occurrences within 30 days. This study was designed to identify independent risk factors for readmission after total hip arthroplasty (THA).

The study used data from the American College of Surgeons - National Surgical Quality Improvement Program Database. Data were obtained from 315 participating hospitals in 43 states, with these data reviewed to identify all patients undergoing THA in 2011. The sample was stratified into readmitted and non-readmitted cohorts, with these groups compared by preoperative comorbidities, preoperative laboratory values, operative characteristics and demographic factors.

A total of 9,441 patients were identified, with 3.65% readmitted within 30 days. Those who were readmitted had a significantly higher rate of diabetes ($p<0.001$), chronic obstructive pulmonary disease ($p<0.001$), corticosteroid use ($p<0.001$), bleeding disorders ($p<0.001$), blood transfusion ($p=0.035$), systemic sepsis ($p<0.001$), dyspnea ($p<0.001$), previous cardiac surgery ($p=0.002$), and hypertension ($p<0.001$). An increasing trend was found between readmission and body mass index (BMI) with the highest readmission rate of 5.99% seen among those with a BMI of greater than 40 kg/m², and the lowest rate of patients in the overweight category (25-30kg/m²).

Conclusion: This study found that, among patients undergoing a total hip arthroplasty, certain medical comorbidities increase the patient's risk for readmission.

Mednick, R., et al Factors Affecting Readmission Rates following Primary Total Hip Arthroplasty. *J Bone Joint Surg.* 2014, July; 96 (14): 1201-1209.

REFRACTORY OSTEITIS PUBIS TREATMENT

Groin pain is a common complaint among athletes. Osteitis pubis (OP) is a potential cause of chronic symptoms among athletes, with the pathologic process not well understood. This condition is characterized by chronic groin pain and pubic symphysis tenderness, and pain with resisted hip abductor and lower abdominal movements. As bisphosphonate has been used as a treatment for other bone marrow edema (BME) syndromes, this study reviewed the outcomes of patients with refractory OP treated with pamidronate.

This retrospective study reviewed the cases of eight, high-level athletes diagnosed with refractory OP based upon groin pain and BME on MRI. The athletes completed a questionnaire concerning their pain at rest, during activities of daily living and during sports. All participants received IV pamidronate, with a second dose offered after a three-month interval if symptoms had not improved sufficiently. The primary outcome variable of interest was return to sport.

The mean duration of symptoms prior to treatment was 19 months. At 15-week follow-up, five of the eight patients rated their status as significantly improved and returned to

sport. One patient described the progress as improved, and two reported no change. Pain with activities of daily living ($p=0.004$) and pain during sports ($p=0.001$) both improved significantly.

Conclusion: This retrospective study of eight athletes with refractory osteitis pubis, each treated with a single dose of IV pamidronate, found that the majority reported significant improvement and were able to return to sport.

Wedatilake, T., et al. Treatment of Osteitis Pubis with Pamidronate in Athletes. *Intern Musculoskel Med.* 2014; 36(1): 23-25.

REHABILITATION ADVANCES FOLLOWING TOTAL KNEE ARTHROPLASTY

While total knee arthroplasty (TKA) surgery often succeeds in improving pain and function, quality-of-life, lower extremity kinematic, and kinetic gait abnormalities often persist. This study evaluated the effects of a biomechanical therapy (Apos Therapy) for patients undergoing TKA.

This prospective study included 17 patients, all initiating treatment at three months post-surgery. The biomechanical therapy was designed to combine center of pressure manipulation in the foot with perturbation during walking. The system consists of two convex shaped biomechanical elements attached to each of the patient's shoes, one located under the hindfoot region and one located under the forefoot region of each foot.

Each patient trained with the device indoors during activities of daily living each day, increasing to 30 minutes per day after four weeks, and 60 minutes per day after six weeks. Outcome measures included walking speed, step length, single limb support (SLS), changes in pain, knee and overall function, and quality-of-life perception.

Walking velocity improved by 46.9%, and SLS on the operated limb by 13.1%. Pain improved by 65.3%, stiffness by 57.6% and function by 64%. The Knee Society Score for overall function improved by an average of 83.7% and the Knee Society Score for knee function improved by 60.6%.

Conclusion: This uncontrolled study of patients undergoing total knee arthroplasty found that biomechanical therapy, beginning at three months post-surgery is

associated with improvements in gait patterns, functional scores and self-evaluation questionnaire results.

Elbaz, A., et al. New Approach for the Rehabilitation of Patients Following Total Knee Arthroplasty. *J Orthopedics.* 2014, June; 11(2): 72-77.

SELF-REPORTED PHYSICAL FRAILITY IN THE ELDERLY

The ability to predict disability may provide an opportunity to offer early intervention to reduce or postpone disability in the elderly. This study examined whether self-reported physical frailty can improve the prediction of disability among the elderly.

This longitudinal study assessed self-reported physical frailty and subsequent disability in 355 Dutch individuals, ages 65 or older. A questionnaire was provided, which included queries concerning frailty and disability, with follow-up two and half years later. Physical frailty was identified using components of the Tilburg Frailty Indicator (TFI), including unintentional weight loss, weakness, poor endurance, slowness, low physical activity, poor balance, poor hearing and poor vision. Disability was measured with the Groningen Activity Restriction Scale (GARS). Those 65 years or older who completed questionnaires at both intervals were included in the analysis.

All eight physical frailty components of the TFI were strongly associated with all three disability variables [total, instrumental activities of daily living (IADLs) and activities of daily living (ADLs)], assessed two and a half years later. Bivariate regression analysis indicated that low physical activity predicted both total and ADL disability. Slowness predicted both total and IADL disability. Weakness predicted ADL disability. Weight loss, poor endurance, poor balance, poor hearing and poor vision did not contribute to the prediction of future disability.

Conclusion: This study suggests found that self-reported frailty assessments using the physical subscale of the Tilburg Frailty Indicator can aid in predicting future disability among individuals 65 years of age and older.

Gobbens, R., et al. The Prediction of Disability by Self-Reported Physical Frailty Components of the Tilburg

Frailty Indicator. **Arch Gerontol Geriatr.** 2014, September-October; 59(2): 280-287.

SHOULDER RANGE OF MOTION INFLUENCES ELBOW INJURIES IN PITCHERS

Retrospective studies have indicated that shoulder range of motion deficits are associated with increased elbow injuries in baseball pitchers. This study prospectively reviewed this relationship.

All major and minor league pitchers within a single professional organization were studied over eight competitive seasons.

Anthropomorphic data were recorded during spring training. These included shoulder range of motion, as measured with a bubble goniometer. Data were obtained from 505 pitcher seasons, with subjects pain-free and asymptomatic at the time of the testing. Shoulder range of motion deficits in the pitching arm were defined as five degrees less than those of the contralateral arm in flexion, external rotation and total rotation. Internal rotation deficits were defined as a greater than 20° difference between arms. The pitchers were followed during the subsequent season for elbow injuries.

Overall, 12.8% of the players sustained elbow injuries. Deficits in total rotation in the throwing shoulder correlated with a 2.6-fold increased risk of elbow injury. Deficits of shoulder flexion correlated with a 2.8-fold increase in the risk of elbow injury. No significant increase in elbow injuries was seen among those with deficits in glenohumeral internal rotation or external rotation.

Conclusion: This study of professional baseball pitchers found that those with a deficit in the throwing shoulder total rotation, as well as shoulder flexion, are at an increased risk for elbow injuries.

Wilk, K., et al. Deficits in Glenohumeral Passive Range of Motion Increase Risk of Elbow Injuries in Professional Baseball Pitchers: A Prospective Study. **Am J Sports Med.** 2014, September; 42 (9): 2075 – 2081

SURVIVAL AND OUTCOME AFTER HIP FRACTURE IN NURSING HOMES

Hip fractures occur 300,000 times each year among older adults, with residents of long-term nursing homes twice as likely as community dwelling

individuals to sustain such a fracture. This study reviewed the patterns and predictors of mortality and functional decline among nursing home residents with hip fracture.

Data included the Long-Term Care Minimum Data Set (MDS) from 2005 to 2009, with Medicare Provider Analysis and Review (MedPar) files for the same period. From these data were retrieved information concerning Medicare beneficiaries who were hospitalized for acute hip fractures incurred while residing in long-term nursing homes. Baseline data concerning the patients' function were obtained from the MDS, while clinical outcomes were obtained from hospital records. The primary outcome variable was death from any cause within 180 days of hospital admission. Secondary outcomes included post-fracture mobility and ADL performance.

Of the 60,111 nursing home residents reviewed, 36.2% died within 180 days after the fracture, and 47% died within one year. The greatest decreases in survival occurred among those older than 90 years of age ($p < 0.001$), those with nonoperative fracture management ($p < 0.001$), and those with advanced comorbidities, defined as Charleston score of at least five ($p < 0.001$). Among those who survived for 180 days, new total dependence in locomotion occurred in 27.8%.

Conclusion: This study of long-term nursing home residents with hip fracture found that, within 180 days, more than one of three had died, with survival decreasing among those at least 90 years of age, those managed nonoperatively and those with high comorbidities.

Neuman, M., et al. Survival and Functional Outcomes after Hip Fracture among Nursing Home Residents. **JAMA Int Med.** 2014, August; 174(8): 1273-1280.

TELE-CARE MANAGEMENT OF CHRONIC PAIN

It has been estimated that two thirds of pain related outpatient visits in the United States involve musculoskeletal pain. This study was designed to determine the effectiveness of a telephone delivered collaborative care intervention for primary care patients with chronic musculoskeletal pain.

Patients, 18 to 65 years of age with musculoskeletal pain of moderate severity, and at least three months' duration, were randomized to an intervention or control group. The intervention group underwent

automated symptom monitoring, either by interactive voice recorded telephone calls or through the internet. Using reports from these data an analgesic algorithm was used to recommend medication use, with six categories of analgesics used. These medicines were prescribed by either the study physician or the primary care physician. The primary outcome was the change in the Brief Pain Inventory (BPI) score.

Of the 250 patients enrolled, 124 were placed in an intervention group and 126 in a control group. Those in the intervention group demonstrated significantly greater improvement in their BPI scores ($p < 0.001$) during the 12-month trial, as well as greater improvement in BPI severity ($p < 0.001$) and Interference Scale scores ($p < 0.001$). Those in the intervention group were almost twice as likely to report at least a 30% improvement from their baseline pain scores by month 12.

Conclusion: This study found that a collaborative tele-care management intervention system for patients with chronic pain can produce clinically meaningful improvements in pain, accompanied by greater patient satisfaction with pain treatment.

Kroenke, K., et al. Tele-Care Collaborative Management of Chronic Pain in Primary Care: A Randomized, Clinical Trial. **JAMA.** 2014, July 16; 312(3): 240-248.

TOTAL HIP REPLACEMENT AMONG PATIENTS WITH OSTEOARTHRITIS AND RHEUMATOID ARTHRITIS

Over 50% of patients with rheumatoid arthritis (RA) have reported orthopedic procedures. The outcomes of total hip replacement among patients with RA are not well described. This study assessed pain, function and quality-of-life two years after hip replacement, comparing patients with RA and those with osteoarthritis (OA).

Data were reviewed concerning patients undergoing total hip replacement between 2007 and 2011. From these data, the authors identified patients receiving hip replacements due to RA or OA. Data collected included demographic information, the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), the SF-12v2 Short Form Health Survey, comorbidities and the American Society of Anesthesia Score.

The analysis included 5,473 patients

with OA and 193 with RA. Similar proportions of patients with RA and with OA had clinically significant improvements in function, although patients with RA had significantly worse WOMAC function at two years ($p<0.001$). Patients with RA had worse preoperative WOMAC pain scores ($p<0.001$) and worse WOMAC pain scores at two years ($p<0.001$) than did patients with OA.

Conclusion: This study of patients undergoing total hip replacement found that those with RA continued to experience worse WOMAC pain and function two years after total hip replacement than did those with OA.

Goodman, S., et al. Patients with Rheumatoid Arthritis Are More Likely to Have Pain and Poor Function after Total Hip Replacements than Patients with Osteoarthritis. *J Rheum.* 2014, September; 41(9): 1774-1780.

VENOUS THROMBOEMBOLISM IN UPPER EXTREMITY PROCEDURES

The overwhelming majority of research into venous thromboembolism (VTE) rates after orthopedic procedures comes from studies of lower limb surgery. This study was designed to determine the

rate of postoperative VTE within all upper limb procedures in a large teaching hospital.

Data were obtained from a complete set of surgical records at a teaching hospital in Worcestershire, United Kingdom. Between 2009 and 2012, 3,357 surgeries were completed. For each of these procedures, records were reviewed for evidence of pulmonary embolism (PE) or deep venous thrombosis (DVT) within 90 days of the surgery.

Of the 3,357 events, a postoperative VTE was identified in six patients, including four with PE and two with DVT, providing a 0.0018% incidence. Five of the six patients had a strong family or personal history of VTE. All PE were diagnosed by CT imaging. Both DVTs were diagnosed by ultrasound imaging.

Conclusion: This retrospective study of patients undergoing upper extremity orthopedic procedures found a 0.0018% incidence of postoperative venous thromboembolism.

Hastie, G., et al. Venous Thromboembolism Incidence in Upper Limb Orthopedic Surgery: Do These Procedures Increase Venous Thromboembolism Risk? *J Shoulder Elbow Surg.* 2014, October; 23 (10):1481-1484.

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