OCCUPATIONAL HEALTH

SPECIAL INTEREST GROUP

President's Message

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The Orthopaedic Section and the OHSIG are proud to announce the most **recent independent study course, The Injured Worker**. This is your chance to learn from the experts and add value to your practice without traveling or taking time away from the clinic. Increase your expertise in all areas of work-related health with 6 separate monographs. You probably know the expert coauthors of the first monograph: Deidre Daley, PT, DPT, MSHPE, Jill Galper, PT, MEd, and Margot Miller, PT. Check out all of the authors and topics covered. The course is available now at the Orthopaedic Section web site http://www.orthopt.org/content/education/independent_study_courses.

Occupational Health/Work Compensation Advocacy Agenda

Following is a summary of 4 primary objectives for physical therapist advocacy in workers' compensation and occupational health. A staff-selected workgroup met on April 12, 2014, to review and update this document. Strategies were developed to achieve each priority and objective. Reach out and connect with these participating colleagues to give your input and comments regarding Physical Therapists in the realm of work: Reuben Escorpizo, Gary Lusin, David Hoyle, Heidi Ojha, John Lowe, Lorena Pettet Payne, James Hughes, Joe Koloc, Jill Floberg, Trisha Perry, Karen Jost, Sean Stratmoen, Lisa Culver, and Justin Elliott.

Objective 1: Position PTs as leaders and valuable contributors to workers' compensation/occupational health

Highest priority: *Develop Clinical Practice Guidelines for work rehabilitation to highlight*
- o *Value of physical therapists in keeping workers at work/returning to work*
- o *Value of early access to physical therapists*

Objective 2: Ensure PTs are aware of and compliant with workers' compensation regulations (including WC, ADA, OSHA, etc.)

Objective 3: Educate PTs in best practices for managing workers with health conditions

Highest priority: *Create a toolbox of resources and educational materials for PTs*

Objective 4: Ensure PTs have influence on regulation/legislation/policy

Highest priority: *Increase presence of PTs on workers' compensation commissions and advisory boards*

APTA has **submitted comments to the Bureau of Labor Statistics** regarding the Occupational Requirements Survey. Thanks to Karen Jost at APTA and Rick Wickstrom for drafting the comments. Below is an excerpt from the comment letter.

"BLS requested comments that focus on four specific areas related to the proposed Occupational Requirements Survey (ORS): evaluate whether the proposed collection of information is necessary for the proper performance of functions of the agency, including whether the information will have practical utility; evaluate the accuracy of the agency's estimate of the burden of the proposed collection of information, including the validity of the methodology and assumptions used; enhance the quality, utility, and clarity of the information to be collected; and minimize the burden of the collection of information on those who are to respond.

"APTA supports the necessity of collecting updated occupational data to better inform SSA decision-making, particularly in terms of identifying appropriate and relevant job categories for disability claimants. The vision statement for the physical therapy profession is "Transforming society by optimizing movement to improve the human experience." The ability to move about and interact in work and daily life is a critical component of the human experience. As such, we encourage BLS to ensure that the ORS data collected is valid and clear such that it enables appropriate identification of potential work opportunities.

"APTA is concerned that the ORS data being collected may not be accurate, and that subsequent use of the data may result in inappropriate disability adjudication decisions. APTA encourages BLS to conduct a validation study to verify that the ORS data being collected is truly representative of the job demands."

The Effects of Dynamic Intervention on Reducing the Risk of Work-related Reinjury

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INTRODUCTION

Every year millions of workplace injuries occur and cost the country billions of dollars. Despite implementation and focus on workplace safety and health programs, the incidence, prevalence, and costs of work-related injuries continue to rise. According to the U.S. Bureau of Labor Statistics, private industry employers reported 2.8 million nonfatal workplace injuries in 2012.[1] The Occupational Safety and Health Administration (OSHA) estimate that employers spend almost $1 billion per week for direct workers' compensation costs.[2]

A key factor in the direct costs and severity of these reported

injuries are the recorded days away from work. In 2012, the median days away from work had increased from 8 days in 2011 to 9 days. When the injury was classified as a musculoskeletal disorder the median number of days before returning to work increased to 12 days.[3] This is an alarming number of days for many organizations because 34% of all workers who sustained a workplace injury requiring days off work, sustained a musculoskeletal disorder.

Workers with back injuries alone are the most prevalent and costly occupational injury after returning to work because a substantial portion have recurrences.[4] There are limited studies that looked at methods to reduce the recurrence rate or discussions on data collection of cases with reinjuries. Radoslaw et al[5] are among the few authors who have conducted studies to examine whether recurrences substantially contribute to the total medical and indemnity costs as well as the total duration of work disability. The high burden of recurrent episodes of low back injury is robust, and total costs and duration of work disability have substantially higher costs and longer duration of work disability than those without recurrence, suggesting an intensive application of worker education and an active exercise program to reduce the risk of reinjury. This is the only evidence of its kind in the workers' compensation arena to suggest a link between the reductions of work-related reinjury to dynamic intervention post initial injury.

There is agreement that many workers with acute low back injuries will suffer a recurrence, but the only meaningful way to study the incidence of recurrence is to enroll a cohort of patients at risk of recurrence, use a standardized definition of an episode of low back pain, and follow all patients for the same length of time. Further research is warranted because few studies have examined the recurrence of injury and the lack of a standard definition for recurrence of injury have resulted in potentially flawed estimates.[6] The purpose of this literature review is to examine the evidence that supports the effectiveness of dynamic intervention on reducing the risk of work-related reinjury.

METHODS

Various electronic databases were searched from February 15-18, 2014, including PubMed, Science Direct, *Journal of Orthopaedic and Sports Physical Therapy, Physical Therapy, Journal of Strength and Conditioning*, and Google Scholar. Initially, an advanced search was performed using the terms "functional training AND risk of reinjury" resulting in 6 articles and "dynamic training AND risk of reinjury" with no results. The search was then broadened to find more research studies using the simple search with terms such as "movement," "reinjury," "specificity," "exercises," and "dynamic," along with cross-referenced articles. The studies found were then screened by their titles and the relevance of the abstracts to the clinical question, resulting in 31 articles of interest. Of the total articles found, 4 articles met the inclusion criteria of research with adult human subjects published within the previous 10-year period. The articles included musculoskeletal injuries only; those involving cardiopulmonary and neurological disorders or dysfunctions were excluded. Only one systematic review was found. No randomized controlled trials were discovered. All relevant research studies used in this review regarding the effects of dynamic intervention referred to the athletic population, rather than our primary interest in the occupational health population.

REVIEW OF THE LITERATURE

Herman K, Barton C, Malliaras P, Morrissey D. The effectiveness of neuromuscular warm-up strategies that require no additional equipment, for preventing lower limb injuries during sports participation: a systematic review. *BMC Med*. 2012;10:75.

Herman et al[7] conducted a systematic review to determine which neuromuscular strategy is most effective in preventing lower extremity injuries during sports and in which sporting group they are effective. According to the authors, stretching alone is not sufficient enough to prevent injuries, and they mention various neuromuscular strategies that have been hypothesized to be necessary in improving joint position sense, joint stability, and protective joint reflexes. The studies included in their review involved an average of 1500 participants investigating both male and female athletes in two studies and only females in the remaining 7 studies.

The studies researched the effectiveness of various neuromuscular strategies, such as the Knee Injury Prevention Program (KIPP), the 11+, the 11, and the HarmoKnee program. For undefined lower limb injuries, the 11+ and KIPP strategies were found to be significantly more effective in reducing the risk of overall lower limb injuries and lower limb overuse injuries. For hip and thigh injuries, the 11 program demonstrated reduced risk of groin injuries. The HarmoKnee and the 11+ program significantly reduced the risk of knee injuries. The Prevent Injury and Enhance Performance (PEP) strategy was found to be the most effective neuromuscular strategy in reducing ACL injuries. The PEP strategy significantly reduced the risk of reinjury in previous non-contact ACL injuries. The Anterior Knee Pain Prevention Training Programme (AKP PTP) strategy significantly reduced the incidence of anterior knee pain. The KIPP strategy was found to reduce non-contact ankle sprains.

The authors discussed that, apart from a few methodological weaknesses, the studies demonstrated that better injury prevention could be attained when these neuromuscular strategies include a combination of stretching, strengthening, balance exercises, sport-specific drills, and landing techniques. Positive benefits were also reported when the strategies are continued for longer than 3 months.

Herman SL, Smith DT. Four-week dynamic stretching warm-up intervention elicits longer-term performance benefits. *J Strength Cond Res*. 2008;22(4):1286-1297.

Herman and Smith[8] conducted this study to evaluate whether a dynamic stretching warm-up (DWU) performed daily over 4 weeks positively influenced power, speed, agility, endurance, flexibility, and strength performance measures when compared to a static stretching warm-up (SWU) in collegiate wrestlers. The authors included 24 National Collegiate Athletic Association Division-I male wrestlers and assigned them randomly to two intervention groups of the treatment condition; DWU or the active control condition, and SWU by using a random digit algorithm. In total, 13 wrestlers were assigned to the SWU group and 11 to the DWU group; however, due to withdrawals such as injury, quitting, and/or the inability to continue participation, only 10 wrestlers concluded the study in each group. Each participant underwent (1) an orientation that included screening for eligibility to participate, (2) introduction to the purpose and methods of the study, and (3) verbal and visual presentation of DWU and SWU interventions and

functional performance tests. The participants were then asked to rehearse the warm-ups and the tests. The experimental period included 4 weeks of either 11 DWUs or 8 SWUs, depending on the group and baseline, and 4-week follow-up measurements were taken for anthropometric measurements and performance tests.

The performance tests that were used in the study assessed total body explosive power, anaerobic fitness, muscle strength and endurance of the arms, shoulder girdle and the abdominal muscles, lower body power, acceleration, and agility. The authors noted various researchers have validated the use of these measurements for the properties required in wrestling, hence making the measurements sport-specific. The baseline characteristics demonstrated no difference except the decreased muscular endurance and longer time to finish the 600-m long run in SWU group as compared to DWU, with no difference in peak torque for hamstring, flexibility of hamstring and trunk and pull-up specific endurance. The 4-week follow-up revealed improvement in quadriceps peak torque, broad jump, medicine ball underhand throw for distance, sit ups, push-ups, time to complete a 300-yard shuttle run, as well as the 600-m run in the DWU group, as compared to a decreased push-up performance and 600-m run with no improvement in other measurements in the SWU group; thereby accentuating the improvement in push-ups and 600 m in the DWU group.

The authors proposed that the DWU group demonstrated improvements in the physical performance test 24 hours after the last DWU was performed, supporting the long-term effects of DWUs, which also reflects possible improvements. Herman and Smith[8] suggested that the improvement might be a result of the involvement of multiple contributing factors, which included, but were not limited to, sport-specific movements, increased muscle, and core temperature. This study suggests that when athletes are trained using sport-specific dynamic movements, it is possible for these physiological improvements to be sustained for a longer duration; therefore, long-term improvements can be seen in their sport performance.

Strengths of this study included the avoidance of group contamination by allowing no contact between the intervention groups, by allowing no other physical training apart from standardized wrestling drills, and by requiring measurements to be recorded at the same time. The design of the study was quasi-experimental with inadequate randomization, no blinding, and no treatment control group; thereby, decreasing the strength of the study.

Sherry MA, Best TM. A Comparison of 2 Rehabilitation Programs in the Treatment of Acute Hamstring Strains. *J Orthop Sports Phys Ther*. 2004;34(3):116-126.

In their prospective randomized comparison of two rehab programs, Sherry and Best[9] found a difference in the percentage of recurrent hamstring strain when following up at two weeks and one year after return to sport. Only 7.7% of subjects who completed a progressive agility and trunk stabilization program suffered a recurrent injury compared to 70% of the subjects who completed a hamstring protocol consisting of static stretching, isolated resistive exercise, and icing.

In the article, the effectiveness of two rehabilitations programs used to treat acute hamstring strains were compared by assessing time needed to return to sports and reinjury rate at two weeks and the first year post return to sport. A total of 24 subjects with acute hamstring strains were recruited by means of posters, local physicians, athletic trainers, and physical therapists. Using a 4-block fixed-allocation randomization process, 11 subjects were assigned to a hamstring stretching and strengthening (STST) intervention group while the other 13 subjects were assigned to a progressive agility and trunk stabilization (PATS) intervention group. Both rehabilitation programs were completed as home exercise programs on a daily basis and subjects were encouraged to continue their programs at least 3 days a week for two months after returning to sports. Subjects were evaluated every 7 days to monitor progress, and readiness to return to sports was determined by meeting specific criteria for manual muscle testing, absence of palpable tenderness, and demonstrating subjective readiness following agility and running screens. In addition, functional testing consisting of variations in hopping and a single sprint were also performed on the day of return to sport to ensure a safe return.

The authors found that recurrence of hamstring strain within the first 16 days of return to sports occurred in 54% of athletes from the STST program and 0% from the PATS program. Within the first year of returning to sports, recurrence of hamstring strain was present in 70% of athletes from the STST program versus an impressive 7.7% from the PATS program. The likelihood of reinjury was significantly less for the athlete in the PATS group at two weeks and one year after return to sport. Other findings showed that time needed to return to sports, number of days of rehabilitation, performance on the functional testing profile, and severity of injury were not statistically significant.

A rehabilitation program consisting of agility and trunk stabilization exercises proved to be more effective than a traditional stretching and strengthening program when considering the effect on preventing injury recurrence in athletes with acute hamstring strains. However, the authors identified that there were no measurements taken to assess both trunk stability and neuromuscular control pre- and postintervention programs. Therefore, the results of this study could not be attributed to changes in trunk stability, coordination, or other aspects of motor control. Perhaps an improved functional test profile should be designed to better predict successful return to sports.

Comfort P, Green CM, Mathhews, M. Training considerations after hamstring injury in athletes. *Strength Cond*. 2009;3(1):68-74.

The purpose of this study was to propose an effective treatment approach for athletes with a hamstring strain and to reduce its recurrence upon their return to sport. Comfort et al[10] reviewed the effects of sport-specific and advanced strength and conditioning training involving stretching, strengthening, eccentric training, plyometric and agility drills on athletes returning to sport. The review suggested the importance of tailoring the treatment and rehabilitation of an athlete to the healing process and the demands of the specific sports.

According to the authors, healing of the strained muscle fibers was marked by formation of both shorter and less elastic connective tissue. This formation resulted in decreased flexibility, impaired functions, replacement of muscle fibers with scar tissues of decreased tensile strength, and disrupted stretch shortening cycles. These results ultimately end in restricted contraction, poor lengthening, and increased risk of re-rupture. To regain the lost flexibility, the authors discussed the use of

concurrent stretching and strengthening exercises progressing to dynamic activities; which stimulate the muscle protein synthesis and muscle growth in the direction of stress lines. Adding or removing the sarcomeres then leads to increasing the functional length. When performed in conjunction with advanced and functional strength training, the stretching aligns the sarcomeres for optimum force, velocity, and power generation.

This review supported a decreased risk of reinjury when training included drills that met sport-specific demands such as the combination of strength training, stretching, agility, trunk stabilization, running, and plyometrics. It is also recommended that training should consider factors that include mechanism of injury, force exertion, and type of muscle actions and movement patterns involved in the sport in order to fully rehabilitate athletes prior to return to their sport and to reduce the potential recurrence of injury.

DISCUSSION AND CLINICAL APPLICATION

The literature presented in this review reported the positive effects of incorporating a sport-specific, dynamic intervention approach to an athletic patient population resulting in reduced recurrence of injuries. Comfort et al[10] reported a 7% decrease in recurrence of hamstring injury when tailoring the treatment and rehabilitation programs of athletes to their sport-specific demands. Findings of lower recurrent hamstring injuries were significantly less when agility and trunk stabilization exercises were compared to stretching and strengthening activities alone. In their prospective randomized comparison of two rehabilitation programs, Sherry and Best[9] also reported similar findings, suggesting a decreased likelihood of reinjury for an athlete participating in a progressive agility and trunk stabilization intervention group. Results were recorded after return to their respective sport, at both the two-week and one-year time frame.

Although none of the studies directly mentioned the occupational health population, many of the same physical demands are shared in both sport and work settings. An understanding of sports athletes may be applied to the working population, which is required to meet physical demands in extreme conditions. The articles reviewed show the promise of positive clinical implications toward the plan of care for work-related reinjuries.

Following the review of these 4 articles, further research is still warranted in order to validate our suggestion of the effectiveness of dynamic intervention on reducing the risk of work-related reinjury in the occupational health setting. Understanding work-related movements and physical demands, while incorporating job-specific training, may result in faster conditioning and lower recurrence of injuries upon return to work. There is promise that applying the same dynamic intervention approach toward an occupational health population may elicit results similar to the athletic population.

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