

Prevention of Performance-Related Musculoskeletal Disorders

The article by Clifton Chan et al.¹ in this issue of *Medical Problems of Performing Artists* is the written version of his presentation at the PAMA Symposium that won the 2014 Alice G. Brandfonbrener Young Investigator Award. In it, Chan and his colleagues describe a controlled trial of an exercise program for professional symphony orchestra musicians. One of my first editorials was on the subject of prevention of musicians' injuries,² and a lot of work has been done on this subject in the 8 years since. In this editorial I will attempt to summarize some of the work that has been done since 2006 and suggest how we might build on the momentum that has been created by Dr. Chan and other researchers.

Two other controlled trials of prevention programs for instrumental musicians have been published in *MPPA* since 2006. In 2010, Zander et al.³ described a course that was offered to first-year music students at a university in Germany over 4 years. Of the 327 students who were eligible to participate, 247 agreed and returned the first survey. They were assigned (nonrandomly) to a control group or an intervention group; the latter (n=144) got 32 hours (over two semesters) of a prevention curriculum that was presented by two performing arts medicine physicians. The Feldenkreis approach to injury prevention was part of the course. The intervention group's psychological symptom score improved at the end of the academic year, but their physical symptom scores did not. The control group's scores did not change in either category.

Last year, Lopez et al.⁴ published their study of a warm-up exercise intervention for university-level instrumental music students. They randomly chose 180 students (average age 23) and assigned them to an experimental group (who took a

three credit course on injury prevention with instruction in "proper warm-up," including stretching, and postural hygiene) or a control group (who got no instruction but filled out the same questionnaires). Thirty-one of the students assigned to the control group decided not to participate. Similar proportions of both groups had a history of a performance-related musculoskeletal disorder (PRMD) prior to starting the study. One year later, the experimental group students reported taking breaks more frequently while practicing and were more likely to do a warm-up routine prior to practicing; neither behavior changed in the control group. The experimental group reported a 78% decrease in PRMDs at the end of the year versus no change in the control group.

Dr. Chan's study hypotheses were that "an exercise program would be beneficial for professional orchestral musicians" and that the number of PRMDs and associated risk factors would decrease as a result.¹ Members of eight Australian symphony orchestras volunteered to participate and self-selected being in the control group (n=23) or the exercise group (n=30). The two groups differed in terms of gender and instrument mix and baseline exercise frequency. Exercise group participants got up to 16 guided 35-minute exercise sessions over 10 weeks, led by a trained physical therapist. Participants completed surveys at the beginning and end of the 10-week intervention period and again 6 months later. The exercise group musicians were better off in several respects at the end of the 10-week intervention period (reported PRMDs and rating of perceived exertion during individual practice sessions, among others), but the only significant difference between the two groups 6 months later was a lower rating of perceived exertion during

individual practice sessions for the exercise group participants.

Should we use the findings of these three studies to design and implement prevention programs for university and professional instrumentalists? Before I attempt to answer this important question, we should take a brief look at the injury prevention research that has been done in the last 8 years in occupational medicine and sports medicine. As has been pointed out frequently, performing arts medicine has some similarities with both of these fields, although meaningful differences also exist. Enough studies have been done in both occupational and sports medicine that several systemic review articles have been published. Systematic (or structured) review articles use explicit criteria to judge the relevance and quality of research on a specific topic and attempt to draw conclusions based on the consistency of the findings.

The two systematic reviews of using exercise to prevent injuries in the workplace^{5,6} are both referenced in the Chan article. The review by Boocock et al.⁵ is particularly relevant for those of us who take care of musicians, as it focuses on the prevention of neck and upper extremity injuries. They found "some evidence for positive health effects after work environment/workstation adjustments in (computer) workers with neck/upper extremity conditions." Modifications studied included lighting, office layout, keyboards, and software. The review by Bell and Burnett⁶ examined studies of exercises to prevent occupational back pain. Based on a total of 15 studies that met their inclusion criteria, they concluded that "exercise was effective in reducing the severity and activity interference from low back pain." However, they found "only limited evidence supporting the

use of exercise to prevent low back pain episodes in the workplace.”

Sports medicine professionals have been studying injury prevention for decades. Two articles published in 2007 summarized the work that had been done up to that point. One of them, published in the *Journal of Athletic Training*, was based on the National Collegiate Athletic Association’s (NCAA) injury database and was coauthored by Dr. Randy Dick.⁷ (Many of us know Randy through his efforts to promote the Athletes and The Arts program,⁸ which is jointly sponsored by the American College of Sports Medicine, the Performing Arts Medicine Association, and several other organizations.) The NCAA has been tracking injuries and exposure to injuries in varsity sports since 1982. An exposure is one practice session or one competitive event, and an injury was counted if it required medical attention and resulted in at least 1 day of time loss. The authors analyzed data from 182,000 injuries and over 1 million exposures over 16 years. They found that, across all sports, injury rates were higher in games than during practice, and preseason practice injury rates were higher than in-season or post-season practice injury rates. Overall, the injury rate did not change over the 16 years. Ankle sprains were the single most common type of injury. Football had the highest injury rates for both practices and games; baseball and softball had the lowest rates for practices and games, respectively. The authors recommended that changes be considered to decrease the rate of injuries during preseason practice sessions. The entire article is worth reading with an eye on how sports medicine and per-

forming arts medicine are facing some similar challenges in injury prevention.

Aaltonen et al.⁹ did a systematic review of randomized controlled trials that evaluated injury prevention programs in sports. They found 32 high-quality studies that included almost 25,000 participants. Effective interventions included insoles to reduce lower extremity injuries in military recruits, external joint supports to reduce ankle, wrist, and knee injuries, and multi-intervention training to reduce a variety of sports injuries. Of note, stretching and warm-up programs did not reduce injury rates in military recruits and runners.

So, what should we be doing to reduce the rate of PRMDs in instrumental musicians? The short and obvious answer is “more research.” We now have published research data on a few hundred musicians with mixed results compared with data on tens of thousands of athletes with fairly consistent results (primarily for specific injuries) and thousands of workers, also with fairly consistent results (also for specific injuries). Does it make sense to tell instrumental musicians to do warm-up exercises or specific strengthening exercises in order to reduce their injury risk? I’d like to see at least one study, preferably with randomized assignment to the experimental or control group, that confirms the effectiveness of each of those interventions before making such a recommendation. However, the good news now is that we have at least some evidence that prevention using specific interventions may be possi-

ble. We need to redouble our efforts to confirm these findings and reduce the occupational risk that performing artists encounter every day.

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