Sports Injury Prevention: The Role of the Strength and Conditioning Coach

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ABSTRACT

PREVENTION OF SPORTS INJURIES IS A PRIORITY FOR SPORT STAKEHOLDERS ACROSS THE SPECTRUM OF TRAINING AND COMPETITION. ACHIEVING THIS OBJECTIVE REQUIRES A MULTIDISCIPLINARY APPROACH WITH STRENGTH AND CONDITIONING COACHES PLAYING AN IMPORTANT ROLE IN THE PROCESS. WHEN CONSIDERING SPORTS INJURY PREVENTION STRATEGIES, THE ROLE OF THE STRENGTH AND CONDITIONING COACH CAN EXTEND BEYOND OBSERVING EXERCISE TECHNIQUE AND PRESCRIBING TRAINING TO DEVELOP A ROBUST AND RESILIENT ATHLETE. THIS PAPER PROVIDES STRENGTH AND CONDITIONING COACHES WITH A BROAD OVERVIEW OF THE SPORTS INJURY PREVENTION PROCESS AND OUTLINES EXAMPLES OF HOW STRENGTH AND CONDITIONING COACHES CAN WORK TO PROMOTE AND IMPROVE ATHLETE SAFETY.

INTRODUCTION

Sports injuries contribute a substantial burden on the health care system and an individual’s quality of life (7,18). Moreover, from a sports performance perspective, injuries are a significant barrier to an athlete and/or their team in achieving their performance related goals (13,26). In many sports settings, injury is often viewed as an unpreventable and unfortunate consequence of participation. This is despite evidence showing that the injury risk associated with sports participation can be significantly reduced with the implementation of appropriate preventive strategies (6). However, coach adoption of these strategies has been identified as a substantial barrier to successful injury prevention (8). In particular, coach attitude and knowledge of injury prevention strategies, as well as availability of adequate resources are significant influences on adoption (21,22).

Successful prevention of sports injuries relies on a multidisciplinary approach drawing from public health as well as sports and exercise science perspectives (2). Strength and conditioning coaching is a specific discipline within sports and exercise science with the strength and conditioning coach playing an important role in the overall sports injury prevention process. In fact, according to the National Strength and Conditioning Association (NSCA) Strength and Conditioning Professional Standards and Guidelines (20), strength and conditioning coaches have a “duty to the participants they serve to take reasonable steps to prevent injury, and to act prudently when an injury occurs” (pg. 2). The NSCA guidelines also state that a key role of the strength and conditioning professional is “to provide guidance for the athletes in the area of nutrition and injury prevention” (pg. 13). Improving strength and conditioning coaches’ understanding of why and how sports injuries are prevented may promote uptake of targeted strategies and help strength and conditioning coaches fulfill this responsibility within the profession. Therefore, the purpose of this article is to provide strength and conditioning coaches with a broad overview of a process used to prevent sports injuries. This will help improve understanding and ultimately uptake of injury prevention strategies, and provide potential areas for strength and conditioning coaches to facilitate sports safety and injury prevention.

THE SPORTS INJURY PREVENTION PROCESS

A model that can potentially be used to prevent sports injuries and improve athlete safety is the Translating Research into Injury Prevention Practice (TRIPP) framework (6). This model is a 6-stage process (Table 1) that begins with epidemiology (i.e., injury surveillance) to understand the extent of the injury problem and identify the priority areas for targeted injury prevention strategies. In addition, the primary mechanisms, or causes, contributing to the injury priority areas need to be identified to

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help inform the development of injury prevention strategies. Once the injury priorities have been determined, strategies can then be developed to mitigate the risk of particular injury problems. Development of these strategies can draw from several different disciplines including physiology, biomechanics, psychology, and engineering. Furthermore, these injury prevention strategies are often classified into the “Three E’s of injury prevention”: education, engineering, and enforcement (16).

- Educational strategies: Focus on improving player, coach, and even parent understanding of a specific injury or injury prevention strategy. A topical example of this in sports is in the area of concussion recognition and treatment. Current strategies in concussion prevention target improving coach, player, parent, and medical practitioner knowledge of the signs, symptoms, and recommended return to play guidelines after a concussion. For example, a recent study demonstrated that a coach education program in youth American football targeted at improving coaches’ knowledge of tackling techniques and strategies to reduce the number of collisions in a game resulted in significantly less head impacts when compared with a control group that did not receive the education (15).

- Engineering strategies: Involves the design of protective equipment or the development of an exercise training program that can safeguard the athlete from the injury. An example of engineering strategy is the development of wearable technology to quantify and monitor the physical demands of training and competing, which can be used by coaches to inform the design of a training program. Specifically, the use of GPS and accelerometer based technology is becoming increasingly popular in elite and subelite levels of competition (14). This technology is used to quantify the physical demands of the sport so that the stress associated with training and competing can be balanced with optimal recovery to mitigate the risk of injury (5). In addition, the design and development of an exercise program that may reduce the risk of injury through targeting a known risk factor can fall into the educational category. An example would be targeting the prevention of hamstring strain injuries by improving an athlete’s eccentric hamstring strength, which is an established risk factor for hamstring strain injuries (24). Training programs incorporating the Nordic hamstring exercise have been shown to be efficacious for improving eccentric hamstring strength and mitigating the risk of hamstring injury (25).

- Enforcement strategies: Enforce rules, policies, and practices that have been put in place by governing bodies to prevent injuries and improve athlete safety. For example, enforcing rules that have been put into place by a governing body to prevent dangerous tackling maneuvers or policies regarding staff to athlete supervision ratios in a training environment. A specific example of an enforcement strategy has been recently presented in nonelite youth (11–12 year old) ice hockey. A rule change was implemented in some youth ice hockey leagues that disallowed body checking, the rule change resulted in 3-fold reduction in the injury risk associated with participation (3).

It is important to understand that to optimize the success of sports injury prevention strategies, they should incorporate a blend of all 3 approaches (16). For example, the prevention of anterior cruciate ligament (ACL) injuries among female athletes has been identified as an injury prevention priority. Targeted strategies to prevent ACL injuries include the design of neuromuscular training programs to improve lower-body strength and coordination (engineering) (31); knee braces to provide external support to the knee joint after ACL surgery (engineering) (4); the development and implementation of courses and materials to improve the knowledge and attitudes of coaches, players, and parents toward prevention of ACL injuries (education) (6,19); and policies and practices developed by sporting bodies to improve the widespread implementation of neuromuscular training programs (enforcement) (2).

When a strategy has been developed, understanding the targeted context of implementation is necessary for successful prevention. For example, a neuromuscular training program designed to prevent ACL injuries and delivered to NCAA Division I athletes by a qualified strength and conditioning coach may not be as effective if implementation is attempted by a sport-specific coach with no formal strength and conditioning training to a team of high school athletes (8). When faced with
this situation, a coach lacking specific knowledge in the delivery of exercise-based injury prevention programs may choose to not implement any program at all, leaving the athletes vulnerable to injury. However, it is common for coaches to modify the program to suit their knowledge, and the capabilities of the athletes that they are coaching (22). Although this approach is better than doing nothing at all, it may reduce the effectiveness of the originally designed program (22).

After an injury prevention strategy has been implemented, its effectiveness needs to be evaluated. This can be achieved by recording injuries throughout a season, or number of seasons, to determine if there was a decrease in their incidence. If the strategy was identified as being effective, then its implementation needs to be sustained to ensure long-term protection. However, if it was deemed unsuccessful, addressing the barriers to its successful implementation for the purpose of targeted modifications needs to be undertaken.

THE STRENGTH AND CONDITIONING COACH AND INJURY PREVENTION

Preventing sports-related injuries is a complex problem. The role of the strength and conditioning coach in this area extends beyond observing/correcting exercise technique and prescribing training to develop a robust and resilient athlete. Looking beyond the development of physical capacities of the athlete, there are other responsibilities that align with the role of a strength and conditioning coach that can be useful in the injury prevention process (20).

ENCOURAGE THE REPORTING OF INJURIES

Reporting and documenting injuries is an essential stage in a successful injury prevention and rehabilitation process for the purpose of identifying any specific injury problems. However, there may be a culture within a team that is not conducive to athletes feeling comfortable reporting injuries to staff (28). This culture may stem from a fear of ridicule by teammates or potential decreased playing time as a result of bringing the injury to the attention of coaches and support staff. Strength and conditioning coaches play an important role in developing team culture and promoting attitudes and behaviors that other coaching staff deem to be acceptable (11). Strength and conditioning coaches should strive to work cooperatively with sport-specific coaches, athletic trainers, and other stakeholders within the team/club/school setting to facilitate a culture where an athlete can be comfortable and is encouraged to report injuries. Changing a culture within a team can be challenging, a process which draws on behavioral psychology (6,17).

Although a detailed review into the role that behavioral psychology plays in sports injury prevention is beyond the scope of this study, appropriate modeling of behavior, and the use of mentors can potentially be an effective strategy for improving a coach’s knowledge and behaviors (34). In fact, a 2014 article by Grant, Dorgan, and Griffin (12) indicated that mentoring relationships are important for the professional development of strength and conditioning coaches. Therefore, a potential strategy for strength and conditioning coaches to improve their injury prevention practices is to connect with professionals in the fields of sports medicine, specifically athletic training or physical therapy, as mentors.

Open communication between support staff involved with the team (i.e., coaching staff, strength and conditioning coaches, sports medicine staff) is important for developing a positive culture within a team. For example, if a strength and conditioning coach observes that an athlete’s performance in the weight room has been negatively affected by an injury, the issue should be brought to the attention of the sports medicine and coaching staff to ensure that a plan of action for appropriate rehabilitation can be developed.

Potential strategies to enhance communication between support staff and coaches is through the implementation of a system that measures and monitors athletes’ self-perceptions of wellness. Wellness monitoring has become increasingly popular across different sporting contexts (33). Measuring and monitoring athlete wellness provides coaches, sports performance and sports medicine staff with an indication of how the athlete is coping with the demands of training and competing (10). However, an important additional benefit that has been associated with the implementation of wellness monitoring is that, it can provide a platform to bring athletes, coaches, sports medicine and sports performance staff together to share and discuss information that can be used to improve athlete performance and safety (29).

INTEGRATION WITH SPORTS MEDICINE

Although sports medicine and sports performance practitioners share the common objective of helping an athlete achieve their goals, the 2 professions may approach athlete’s physical preparation from different viewpoints (23). Current trends and modalities in the areas of physical therapy, athletic training, and other allied health professions should not be dismissed by a strength and conditioning coach as not relevant to their objectives. Learning from other professions can help provide additional tools within a strength and conditioning coaches’ “tool box” to help prescribe training that develops a tolerance to the physical demands of training and competing.

Integration of sports performance and sports medicine is also needed for effective rehabilitation of an injury. Previous injury is a significant risk factor for further injury, (24) and a well designed and implemented rehabilitation program may help safeguard an athlete from reinjury (30). Rehabilitation programs traditionally begin with a sports medicine practitioner, such as a physical therapist or athletic trainer, developing and implementing the initial stages of the process. Because the athlete’s recovery improves and the rehabilitation process becomes more specific to the demands of the sport,
integration of the strength and conditioning coach into the program is vital (30). For example, a 4 phase framework for ACL rehabilitation in soccer has been proposed by Bizzini, Hancock, and Impellizzeri (1). Phase 1 and 2 of the framework focus on the return of mobility and stability to the knee, primarily driven by a sports medicine professional. Phase 3 begins to incorporate soccer specific drills, running with intensity, and body contact in a controlled environment. Phase 4 is a return to soccer performance with the focus being to bring physical capacities back to a level necessary for optimal soccer performance.

Phases 3 and 4 present sport-specific challenges to the athlete and is where the expertise of a sports performance professional can provide valuable insight into appropriate exercise progressions and assessments to ensure rehabilitation is optimized. To ensure optimal transitions between phases of the rehabilitation program, the strength and conditioning coach should be aware of the training completed at the front end of the process. This approach helps ensure that the process is sequential in nature and the strength and conditioning coach is well informed to program training at the back end of the process that does not place the athlete at greater risk of reinjury.

**INTEGRATION WITH COACHING STAFF**

When stress from training is not adequately balanced with recovery, the chance of injury is increased (9). In many sporting contexts, the sport-specific coach prescribes on field training to improve the technical and tactical components of performance, whereas the strength and conditioning coach prescribes training to improve the physical qualities that underpin successful performance in the specific sport. Strength and conditioning coaches should be aware of how athletes are coping with the stress associated with technical and tactical training prescribed by the sport-specific coach. Awareness of the athlete’s coping ability is needed to inform the training load prescribed by the strength and conditioning coach to improve the physical component of performance (9). There are many objective and subjective methods that can be used to measure the demands of training and how the athlete is coping with the associated stress. The sessional rating of perceived exertion is a common, cost effective method of monitoring internal training and competition load, whereas accelerometer based wearable technology can provide objective measures of external load through the quantification of running volume and intensity as well as accelerations and decelerations (5,9). However, regardless of the method used, the information collected needs to be evaluated and communicated effectively to all coaching, sports medicine, and sports performance staff to ensure that the training is not placing the athlete at an unnecessary risk of injury. Effective translation of sports science and sports medicine information to coaches requires it to be presented in a language that is familiar to coaches and emphasizes potential improvements in team and individual athlete performance so it can be directly related to the objectives of the coach (27).

**EDUCATING OTHERS**

Unfortunately, it is often the case that athletes and coaches at the junior and lower levels of competition do not have access to strength and conditioning professionals to ensure appropriate methods of physical preparation are being implemented. Improving player and sport-specific coaches’ knowledge of how to prescribe, monitor, and implement training to improve the physical component of performance can have a substantial impact of sport safety. Mentoring has been highlighted as a highly effective strategy for overcoming this barrier to sports injury prevention (32,34). A strength and conditioning coach has expertise in the area of training prescription for athlete populations, sharing this knowledge as a mentor to a sport-specific coach of junior or nonelite athletes has the potential to have a profound impact on athlete safety. This mentoring can be formal, through programs established through sporting bodies such as USA Football’s “Heads Up Football” (http://usafootball.com/headsup), or informally by engaging with local sports associations in the community.

**CONCLUSION**

Sports injuries are common, but when appropriate strategies are effectively developed and adopted by coaches and players, the risk of injury occurrence can be mitigated. The role of the strength and conditioning coach in the sports injury prevention process extends beyond ensuring safe exercise technique, appropriate programming and facility design. Effective communication between coaches, strength and conditioning coaches, and sports medicine staff is imperative for developing a culture within the club that prioritizes athlete safety. Strength and conditioning coaches should stay current on developments in sports medicine related to exercise-based injury prevention and return to play programs. In addition, using a strength and conditioning coach’s expertise through mentoring to educate sports coaches about why sports injury prevention is important, and how it can be accomplished, may have an impact on player safety and ultimately their long-term participation and performance in sport.

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