Role of the Strength and Conditioning Professional in Rehabilitating an Injured Athlete

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THE REHABILITATION OF AN injured athlete has evolved to become the responsibility of a team of sports medicine physicians, coaches, athletic trainers, and strength and conditioning professionals. Rehabilitation has many phases and includes some form of conditioning in each phase. The strength and conditioning professional can assist in many of the phases, particularly with the conditioning. Thus he or she plays an important role in the rehabilitation process.

- **Conditioning vs. Rehabilitation**

Conditioning is defined as a state of health but could be expanded to “a continuum of health and fitness that will ultimately affect performance” [7]. It is likely that a well-conditioned athlete will not only perform better but will also have less chance of injury. Conditioning is typically thought of as the responsibility of the strength and conditioning professional. However, since conditioning involves injury prevention, it is also the responsibility of the athletic trainer.

Many of the principles of rehabilitation are the same as those for conditioning. These principles can be presented in three broad statements:

- To overload the body to elicit a positive adaptation in response to the stress applied;
- To allow an adequate amount of rest so as to gain full advantage of the conditioning;
- To not cause harm.

The athletic trainer and the strength and conditioning specialist apply these principles to both rehabilitation and conditioning. The difference between rehabilitation and conditioning is that the former deals with an injury while the latter does not. It is felt that conditioning is the responsibility of the strength and conditioning professional whereas rehabilitation is the responsibility of the athletic trainer.

However, it is not always clear when rehabilitation ends and conditioning begins. The transition phase is that period when both professionals are involved: the athletic trainer works to rehabilitate while the strength and conditioning professional works to condition. This overlap is commonplace, especially during the transition period.

This article attempts to distinguish between the role of athletic trainer versus that of the strength and conditioning professional during this crucial time. It is important to identify the responsibilities of each so as to avoid any misunderstanding or confusion which can delay healing during this critical time for the athlete.

Rehabilitation is clearly the responsibility of the athletic trainer. But even though his or her primary role is rehabilitation, conditioning is often included, particu-
larly in the absence of a strength and conditioning professional. Conditioning does fall under the athletic trainer's domain of prevention.

**The Athletic Trainer's Role**

The governing body for athletic training, the National Athletic Trainers' Association (NATA), was established in 1950 (1). Yet despite the NATA's efforts, the roles and responsibilities of the athletic trainer in the health care system are still not well understood, even by some members of the rehabilitation team. However, the role of the athletic trainer is well defined (see below) by the NATA's Board of Certification, Inc., and is outlined in their role delineation study (10).

Performance domains of the certified athletic trainer are:

1. Prevention of sports injuries;
2. Recognition, evaluation, and immediate care of sports injuries;
3. Rehabilitation and reconditioning of sports injuries;
4. Health care administration;
5. Professional development and responsibility.

Universal competencies of the certified athletic trainer that transcend domains are,

- Domain-specific content
- Athletic training evaluation
- Human anatomy
- Human physiology
- Exercise physiology
- Biomechanics
- Psychology/counseling
- Nutrition
- Pharmacology
- Physics
- Organization and administration.

The athletic trainer is really the link between the athlete and the team physician. The athletic trainer applies protective taping and padding to prevent injuries, evaluates injuries that do occur, and treats them before referring the athlete, when necessary, to the team physician. He or she also has a role in returning the athlete to competition, under the guidance of the team physician.

Returning the injured athlete to competition requires rehabilitation, which is defined as the process by which the range of motion, neurological function, strength, power, cardiovascular conditioning, and functional ability of an injured athlete are restored, while also maintaining the condition and function of all uninvolved areas (7, 10, 17).

The first goal of rehabilitation should be to cause no further injury to the athlete. Thus the rehabilitation process should be a carefully planned, progressive program that is closely supervised by the athletic trainer. To ensure a gradual progression toward a return to play, rehabilitation should be divided into phases (1). Each phase should have a goal, which should be met before advancing to the next phase. Progress should be measured and recorded for future reference. These records will help the athletic trainer determine when the goal has been accomplished so the athlete can advance to the next phase (10).

A general guideline for rehabilitation, including the phases and general techniques used in each phase, is presented in Table 1. In practice these phases may overlap, but this example demonstrates the progression needed for successful rehabilitation.

### Table 1

**Summary of a Typical Rehabilitation Protocol**

<table>
<thead>
<tr>
<th><strong>Phase 1</strong></th>
<th><strong>Phase 2</strong></th>
<th><strong>Phase 3</strong></th>
<th><strong>Phase 4</strong></th>
<th><strong>Phase 5</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>the PRICE protocol to protect and control inflammation:</td>
<td>restore range of motion and promote healing:</td>
<td>restore strength (there are many tools to provide the resistance training needed, with several variables to consider):</td>
<td>restore power and functional ability:</td>
<td>return to competition:</td>
</tr>
<tr>
<td><strong>Protection</strong></td>
<td><strong>Active and passive movement</strong></td>
<td><strong>Type of exercise: open vs. closed kinetic chain</strong></td>
<td><strong>Plyometrics</strong></td>
<td><strong>Medical clearance</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Therapeutic modalities</strong></td>
<td><strong>Type of resistance: isometric, isotonic, or isokinetic</strong></td>
<td><strong>Sport-specific conditioning</strong></td>
<td><strong>Controlled practice</strong></td>
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<td></td>
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<td><strong>Type of contraction: concentric vs. eccentric</strong></td>
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</table>
The Strength and Conditioning Professional’s Role

The responsibilities of the strength and conditioning professional focus on improving the strength and condition of healthy athletes (3). As stated in the NSCA’s Role Delineation Study, the domains of the certified strength and conditioning specialist (CSCS) are as follows:

1. Program design
2. Exercise techniques
3. Organization and administration
4. Testing and evaluation
5. Exercise science knowledge

Rehabilitation is not directly considered a domain for the strength and conditioning professional. However, because it involves retraining (i.e., the restoration of flexibility, strength, power, and cardiovascular conditioning), several of the domains have a bearing on rehabilitation. In addition, the routine testing done by the strength and conditioning professional can help determine the pre-injury status of the injured athlete. This information guides the rehabilitation program and enables the athlete to return to competition at the appropriate time.

The roles and responsibilities of the strength and conditioning professional may be defined as those activities that rehabilitate, or retrain, the athlete to prepare him or her to re-enter competition (7). Included in this retraining process are the following:

- Re-establish the muscular endurance of the injured area.
- Maintain a healthy psychological profile.

When becoming involved in the retraining process, the strength and conditioning professional should maintain constant and constructive communication with the athletic training and medical staffs.

Program Design

The retraining program should follow the same guidelines as any basic strength and conditioning program but with special consideration to the specific needs of the injured area. The first consideration should be to maintain the strength, flexibility, and condition of the uninjured areas. This part of the retraining process should be implemented early in the rehabilitation program and maintained throughout. The second consideration should be to recover any lost flexibility or strength of the injured area. The normal resistance training program that applies to the uninjured areas should be followed as closely as the injury will allow.

The continuation of normal resistance exercises has a twofold benefit. It helps maintain the athlete’s strength and conditioning and also has a neural “cross-over” effect to help build strength in the injured area. According to Wathen (17), “It has been established that exercising one side of the body produces gains in strength on the opposing side, even if that side is not actively exercised” (p. 30).

Retraining the injured area is the part of program design that usually has the greatest variability (4, 8, 13). Program designs can vary from immobilization to a very aggressive, or progressive, approach. The current progressive approach continues to gain wide popularity with the medical community.

Sherman et al. (16) compared isokinetic exercise rehabilitation to the normal “conservative” protocol and found that the former enabled athletes to reach full recovery in only 6 weeks, whereas it took 24 weeks in the conservative or “rest related” protocol. Although their study examined only isokinetic resistance training, other studies have also supported aggressive retraining.

When training uninjured areas, 1 day of recovery between training sessions for a particular muscle group is the norm. This protocol should also be practiced during retraining in order to reduce inflammation and avoid re-injury (14). The intensity of retraining should begin very low and progress gradually according to the athlete’s ability. In general, lighter resistance and slower movements through the ranges of motion are indicated at the beginning of the retraining.

Although exercise selection is probably the most widely disputed aspect of program design, the progressive inclusion of isometric, isokinetic, and isotonic exercises are highly recommended. In the early phases of retraining before the range of motion has been recovered, flexibility exercises and isometric exercises at various points of the joint range of motion should be included.

The suggested order for restoring range of motion is (a) extension, (b) rotation, and (c) flexion (12). Flexibility training should continue throughout the retraining program. Once range of motion is recovered, the use of closed kinetic chain exercises will help the athlete develop muscular strength and conditioning.
Closed vs. Open Kinetic Chain Exercises

Today injured athletes are returning to the weight room earlier in the rehabilitation process. One trend that has contributed to this phenomenon is the use of closed kinetic chain exercises in the early phases of rehabilitation. Closed kinetic chain exercises are those in which the distal end segment remains fixed throughout the range of motion. An example would be the squat, or other weight-bearing exercises.

Open kinetic chain exercises, on the other hand, are those in which the distal end segment remains free in space throughout the range of motion. These activities are usually non-weight-bearing and were once thought to protect the injury. An example would be straight leg raises with cuff weights. Cuff weights are usually available in the training room and are often used in early rehabilitation. However, further investigation has shown that closed kinetic chain exercises are actually safer during early rehabilitation.

The reason closed kinetic exercises were once considered unsafe (because they are usually weight-bearing) has proven to be the very reason they are now considered safer than open chain exercises. Thus, exercises like the squat are now considered safe during early rehabilitation and are used, for example, in rehabilitating knee injuries such as injury to the anterior cruciate ligament (ACL). Thanks to the stability created by the axial loading during closed kinetic chain exercises, there is less translation of the tibia, which facilitates ACL rehabilitation (15).

It has also been suggested that a simultaneous co-contraction of the hamstrings and quadriceps during closed kinetic chain exercises increases this stability (2), although more recent data has questioned this (5, 6).

Another advantage of closed kinetic chain exercises is that since they can be easily performed in the weight room, the strength and conditioning professional can work with the injured athlete much earlier in the rehabilitation.

Athlete Evaluation

Communication between the athlete and the strength and conditioning professional yields feedback concerning tolerance for pain and ability to perform. There are also many indicators to consider in the daily evaluation of the rehabilitation program (12): the strength and conditioning professional should make use of them:

- Elimination of pain;
- Elimination and no recurrence of inflammation;
- Strengthening of injured area through full range of motion;
- Comparison of strength to uninjured area, or pre-injury status;
- Girth measurement (for swelling);
- Flexibility (range of motion);
- Ability to perform sport-specific and functional activities.

It is imperative to report any changes in the athlete’s status that might require further evaluation by the athletic training or medical staffs. To protect against re-injury, one should be extremely conservative when conducting initial testing. Some general criteria aimed at facilitating the retraining process while protecting against injury include the following:

1. Perform explosive exercises such as Olympic-style lifts only later in the retraining.
2. Progress through active range of motion but do not try to extend it through resistance exercises.
3. Reposition hand grip, foot position, etc., to facilitate range of motion.
4. Remember that resistance training may include more than just weight training using body weight; it might incorporate tubing, medicine balls, or other modes of resistance.

Special Considerations

Psychological considerations are very important in retraining. The strength and conditioning professional should include the injured athlete in the mainstream program as much as possible. He or she should also give the athlete accurate information—in understandable terms—about the injury, retraining process, outlook for recovery, and possible obstacles that might be encountered along the way.

He or she should set attainable goals, then set new goals once the former are reached. This gives the athlete a chance to see immediate and somewhat consistent success. One should also “hear” what the athlete is not saying, as this could indicate a problem as well. Above all, the strength and conditioning professional should emanate a positive attitude.

The retraining program should also make use of alternative techniques that will help maintain and improve the athlete’s conditioning and accommodate for the injured area. Such exercises might include swimming, arm ergometry, or stationary cycling, using only the uninvolved areas.

Programs often face budgetary restraints in choosing equipment for use during retraining. However, many retraining needs can be met at small cost. What is most
important in rehabilitation is therapeutic exercise. It is less important to use therapeutic electrical modalities or expensive rehabilitation equipment, and much of the equipment used in retraining can be shared between facilities such as the training room and the weight room.

**Organization and Administration Issues**

Regardless of whose equipment is being used, it must be kept clean, safe, and in good working order. Today hygiene and sanitation are more important than ever.

Another concern is, who is conducting or supervising the rehabilitation/retraining? Since a national credential for the strength and conditioning profession exists, it may be that an employer could be held accountable for not adhering to a particular standard. In light of this it would be prudent for employers to hire only certified strength and conditioning specialists (CSCS). In addition to the question of liability, it is reassuring for the athlete to know that the strength and conditioning professional has met the minimum standards for certification.

Injury reports and treatment recording forms are another protection against liability, as well as being used for insurance reimbursement in the clinical setting. Today it is critical to document when, how, and by whom an athlete is treated, and to note any progress or setbacks.

Any training (or retraining) program should be progressive and include routine evaluations. The strength and conditioning professional should evaluate the athlete objectively with reliable testing methods. The retraining program should follow a prescribed progression and be documented to include the following:

- Recovery of, or loss of, range of motion;
- Recovery of, or loss of, strength at specific points in the range of motion;
- Recovery of, or loss of, strength to match the contralateral (uninvolved) extremity;
- Return to pre-injury status.

Even with a team approach to rehabilitation/retraining, one individual must ultimately be responsible. We suggest that the physician involved in the retraining process take the ultimate responsibility (and liability).

**Criteria for Return to Competition**

In reality it is the physician who will decide when to return the athlete to competition. But often he or she is unaware of the athlete’s progress in muscle strength, endurance, range of motion, agility, speed, coordination, and cardiovascular endurance (11). The physician often bases his or her decision on tests of muscular strength, circumference measures, and/or flexibility measures. However, an athlete may be returned to competition before he or she is 100% (70 to 100% is usually the range).

**Communication**

It would be helpful if the athletic trainer or the strength and conditioning professional presented the physician with objective data on the athlete’s progress. They should be thorough in their report to the physician. Too often any data that may have been acquired by the strength and conditioning professional is not made available to the physician.

It may also be to the athlete’s advantage to tell the physician, for example, that although he or she has regained only 85% of initial strength, he or she has recovered all flexibility, balance, agility, coordination, and cardiovascular endurance. It is the physician who will then decide when to clear the athlete for competition. Having more information will enable the physician to make a better decision.

Physicians often leave the decision of when to return the athlete to the weight room or the practice field (with limited activity) to the athletic trainer and the strength and conditioning professional. Therefore it is very important that the athletic trainer and the strength and conditioning professional maintain constant communication with the physician and work as a team to achieve a common goal (9).

**Summary**

Given that the athletic trainer is responsible for rehabilitation while the strength and conditioning professional is responsible for conditioning, there is often much interaction. The strength and conditioning professional has an important role on the rehabilitation team, and understanding his or her responsibilities will enable him or her to better serve the athlete during the retraining period.

The strength and conditioning professional should work with the athletic trainer and team physician to design the retraining program, supervise the retraining process, and evaluate the injured athlete’s progress. All must document their efforts, communicate with each other, and work together to accomplish the common goal of promptly—but safely—returning the injured athlete to competition.

**References**


