PHYSICAL TRAINING AND PROFESIONAL FOOTBALL SCHEDULE: PRACTICAL APPLICATIONS

MODULE 4. INJURY PREVENTION AND REHABILITATION STRATEGIES

-CONMEBOL-
EVOLUCIÓN

Presentation

In this last module of the course, we will address one of the most challenging topics for a professional soccer club: injury prevention and recovery strategies for the athlete.

Given the high physical and mental demands of today's soccer, coupled with a demanding calendar featuring simultaneous competitions in different regions of South America, finding best practices to keep players at an optimal level of preparation will allow them to be available for the team throughout the season.

We will see how the work between areas of soccer is fundamental for injury prevention and load control, systemic analysis of indicators and individual alerts and approaches.

In addition, we will discuss the most common recovery strategies in science and the most used in the routines of major professional soccer clubs, presenting at the end a case study of strategic planning throughout a competitive week.

It is important to note that the focus of this module is not to address prevention methods as they relate to physical therapy, medicine and other related areas. Rather, we will address how physical preparation acts with respect to the care of the athlete.

Unit 4.1 Injury prevention

“Preventing injuries” is a phrase that should be used with care in the soccer environment. Can it be that we can prevent injuries, even with the best equipment, well-established processes and interaction between club departments? That is, all injuries?

First, within the area of physical preparation, the two main objectives are to **improve *performance*** and **minimize the risk of injury.** That's right... minimize! The high performance athlete is at the limit of their sporting fitness at various points in their career and, given the high demands of professional soccer, the line between a healthy state and an overloaded/injured state becomes very tenuous.

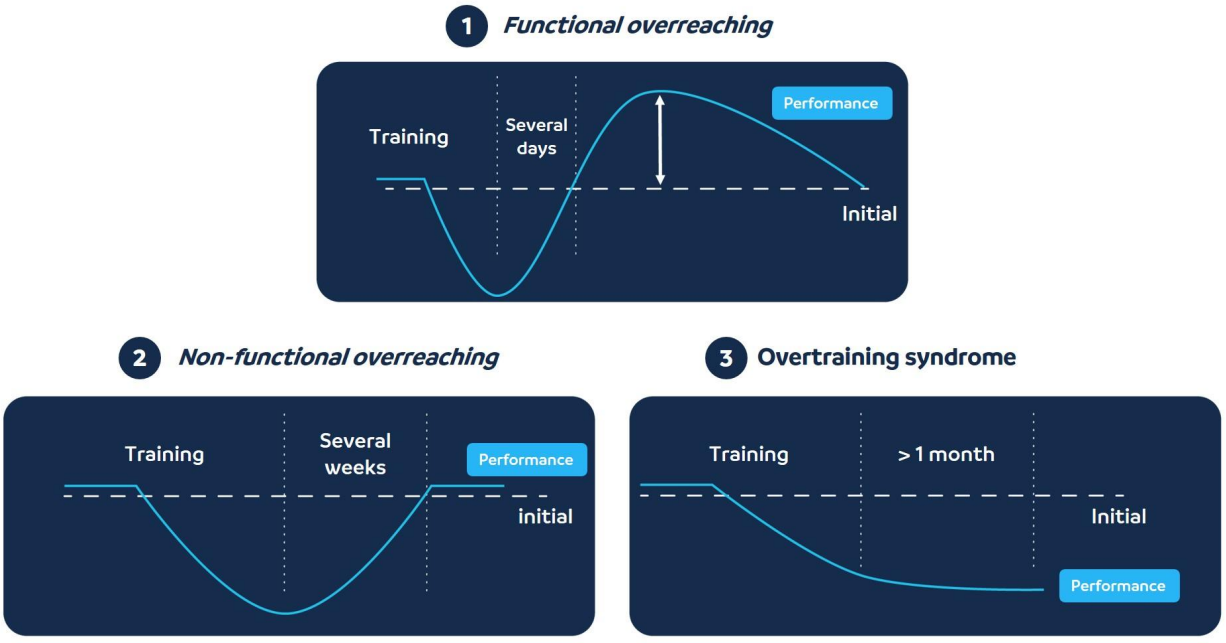
But it is clear that this does not mean that we will always accept the occurrence of injuries, with the justification that it is the work of chance or something inevitable. The focus should be on how much we can advance in the practices of **classification, evaluation and monitoring of athletes**, valuing assertive communication between areas and increasing the athlete's availability to compete at a high level.

In a study conducted with **23 UEFA teams for seven consecutive seasons**, the following data were found (Ekstrand; Hägglund; Waldén, 2011):

- 4,483 injuries occurred during 566,000 hours of exposure; representing an **injury incidence of 8.0 injuries/1000 h**;
- The incidence of injuries during **matches was higher than in training** (27.5 vs. 4.1);
- **A player suffered an average of 2 injuries per season**, and so a team of 25 players can normally expect around 50 injuries per season;
- The **most common** subtype of muscle injury **was to the thigh**, accounting for 17% of all injuries;
- **Relapses constituted 12% of all injuries** and caused longer absences than non-relapses (24 vs. 18 days);
- The incidence of injuries in matches showed an **increasing trend over** time, **both in the first and second half**;
- **Traumatic injuries and hamstring strains** were more common during the competitive season;
- ***Overuse* injuries** were more common during the **preseason**;
- The incidence of training and match injuries remained stable during the period, with no significant differences between seasons.

In the end, injuries reflect an excessive overload on the athlete's body, without required time to restore its function. At this point, it should be noted that there are 3 stages of post-training fatigue. *Functional overreaching*, *non-functional overreaching* and *overtraining* syndrome or overtraining (Meeusen *et al.,* 2013).

Figure 1: Stages of post-training fatigue



Source: own elaboration.

Functional *overreaching* (*short term overreaching*) is the state sought by physical preparation, which the athlete reaches after the stimuli of training/matches. The metabolic, cardiorespiratory, neuromuscular, endocrine and other systems are expected to improve with each stress-recovery-adaptation cycle, aiming to reach a new level of *performance* (Rodrigues; Nakamura; Rabelo, 2019).

For its part, **non-functional** *overreaching* (*long term overreaching*) is the condition (phase) prior to *overtraining*, in which the athlete has a low level of recovery after a sequence of training stimuli/matches, taking weeks for their *performance to* return to the starting point, without the expected adaptation (Rodrigues; Nakamura; Rabelo, 2019). Symptoms such as altered mood, sleep quality, increased perception of exertion in submaximal exercise, reduced lactate concentration and heart rate at submaximal and maximal intensities are very common (Hackney; Koltun; 2012; Kreher; Schwartz, 2012).

Finally, in a condition of extreme wear and tear and inadequate recovery over a long period, the athlete may suffer from what we call ***overtraining* syndrome**. The athlete's body cannot cope with such stress, taking more than a month, on average, to show even the first signs of *performance* recovery, while still remaining far from its starting point. In this case, not only physiological symptoms arise, but also negative psychological responses (Rodrigues; Nakamura; Rabelo, 2019).

Physiological symptoms include **low levels of creatine kinase, cortisol, testosterone and thyroid hormones, suppression of the immune system, poor tolerance to training load and chronic fatigue**. The most common psychological symptoms are **difficulty concentrating, restlessness, loss of appetite, emotional disturbances, apathy and lethargy and, in more severe cases, depression** (Hackney; Koltun; 2012; Kreher; Schwartz, 2012).

Although *overtraining* syndrome is more common in *endurance* sports, some extreme scenarios in soccer such as the combination of match sequences in a short period, long trips and training with high loads can trigger some of the symptoms mentioned above (Rodrigues; Nakamura; Rabelo, 2019).

As we can see, the practice of professional soccer presents scenarios that must be constantly evaluated and monitored by the *performance* and health departments. We will talk about this below.

Transdisciplinary approach

Before moving on to the performance model within a professional soccer club, it is of utmost importance to clarify how different disciplines can relate to each other in that environment.

Multidisciplinarity - "Everyone in his own space".

Multidisciplinarity is when there is more than one area of knowledge in a given project, but each of these disciplines keeps its methods and theories in perspective. It serves to solve immediate problems and does not focus on relationships between disciplines or collaborative gains.

Interdisciplinarity - "With the same purpose".

In this case, more than one discipline is united in a common project, with a plan that links them. During the process, these disciplinary areas exchange knowledge and further progress toward the same goal. As a result, there is new knowledge, which is less fragmented and more dynamic.

Transdisciplinarity - "Knowledge without borders".

This is a much higher and complex level of continuous and uninterrupted knowledge integration. In this case, there are no longer segmented disciplines, but a complex relationship of different areas, none of which is more important than another. It is a process that transcends traditional disciplinary relationships.

In practice, transdisciplinarity must be present in several stages of the routine of a professional soccer club, because at all times it is necessary to make decisions that involve the different areas that support the athlete in training and matches.

This approach can be seen in the following situations:

Considering the **line-up for the next game**, the coach calls in the various areas (physiology, physical preparation, physiotherapy, medical staff) of the club to gather information on the athlete who has significant thigh discomfort and who has not trained well during the week.

In another situation in which an athlete will begin the **process of transition to the field after an ankle injury**, the various areas involved (technical, medical, physiotherapy, physical preparation, physiology, nutrition, psychology) meet to define the planning of each stage until full participation of the player in the team.

Finally, when dealing with a **travel planning** situation **for an away game in a city with high altitude** (e.g. Cochabamba - Bolivia), the departments meet to define the best day for the trip considering the adaptation to the altitude, the selection of the food menu, whether to bring a cook or not, what will be the load and content of the training *on site, and* so on.

Recent research has demonstrated the **importance of internal communication within elite soccer teams** and how it **relates to injuries and players' availability** to train and compete. One study, published in 2019, analyzed 36 elite teams from 17 different European countries during the years 2012 to 2016.

A member of each club's medical team answered a questionnaire to describe their assessment of the quality of the club's internal communication. The quality of communication demonstrated the internal relationships between the medical team (physicians and physiotherapists), their relationship with the coach and physical trainers, and their communication with the board of directors (Ekstrand *et al.,* 2019).

In general, good internal communication within the clubs was correlated with fewer injuries, a low incidence of serious injuries, and greater availability of players for training and matches. The highest level of communication was seen **within the medical team (between doctors and physiotherapists)** with a score of 4.5 (from a possible 2 to 5).

Communication between the head coach and the medical team had the greatest influence on injury and player availability for training and games. Communication between other team members ranged from 3.4 to 3.9 (from a possible 1 to 5 for all) (Ekstrand *et al.,* 2019).

In view of these results, much attention should be paid to the creation of a multidisciplinary task force. It is also important to create a good working environment, respecting the opinions of other professionals.

It is essential that teams work on internal communication (channels, meeting agendas, reports) to foster positive interactions among all team members. The effectiveness of transdisciplinarity requires **assertive communication, proactivity, respect, loyalty and availability**. All of these elements are fundamental for each area involved in the work to feel that they are part of the process.

It is evident that soccer is definitely moving towards an organizational model along these lines. This trend is still very recent and innovative, and there are conceptual difficulties in applying the transdisciplinarity model. However, it seems to be an effective approach to deal with the complexity of events in soccer.

Systemic analysis of alerts (*red* flags)

In order to make more assertive decisions within a soccer club, prioritizing only one piece of information or analyzing the facts from a single point of view can be dangerous and can result in an irreversible outcome. The systemic approach goes beyond the four lines of the field (to use a soccer analogy); it is part of a transdisciplinary approach in which the contribution of each area of knowledge is important.

Currently, large soccer clubs have dozens of pieces of information generated daily, from the health department to the technical department. Using this information in isolation does not allow us to see the situation as a whole.

The term “multifactorial” is very relevant, for example, in injury analysis, rehabilitation prognosis, level of player preparation, on-field *performance*, prediction of career success, etc. We must consider the most relevant variables for each circumstance and each athlete, without forgetting the experience and *feeling of* the decision maker.

When it comes to injury prevention, we cannot forget the main elements that make up the activities within the professional soccer club:

- **Load control;**
- **Internal communication;**
- **Process alignment;**
- **Updated practices.**

Among all of the information available to the club, there is a need to **choose the most valuable and customizable information**, to **contextualize it to make sense of the**

reality of the athlete/club/competition and to **create alerts (or *red flags*) for monitoring over** time.

Red flags are indicators that show that **some response of an athlete or team is out of the ordinary**. It can be a recurring complaint of an athlete (e.g., adductor discomfort for three days in a row), training load above the athlete's expected pattern (3 times the peak distance during a normal week) and so on.

Here are three very practical examples of the use of *red flags* and how to transform this data into relevant information:

Figure 2: Variables generated by the *red flags* representing the performance of some positions

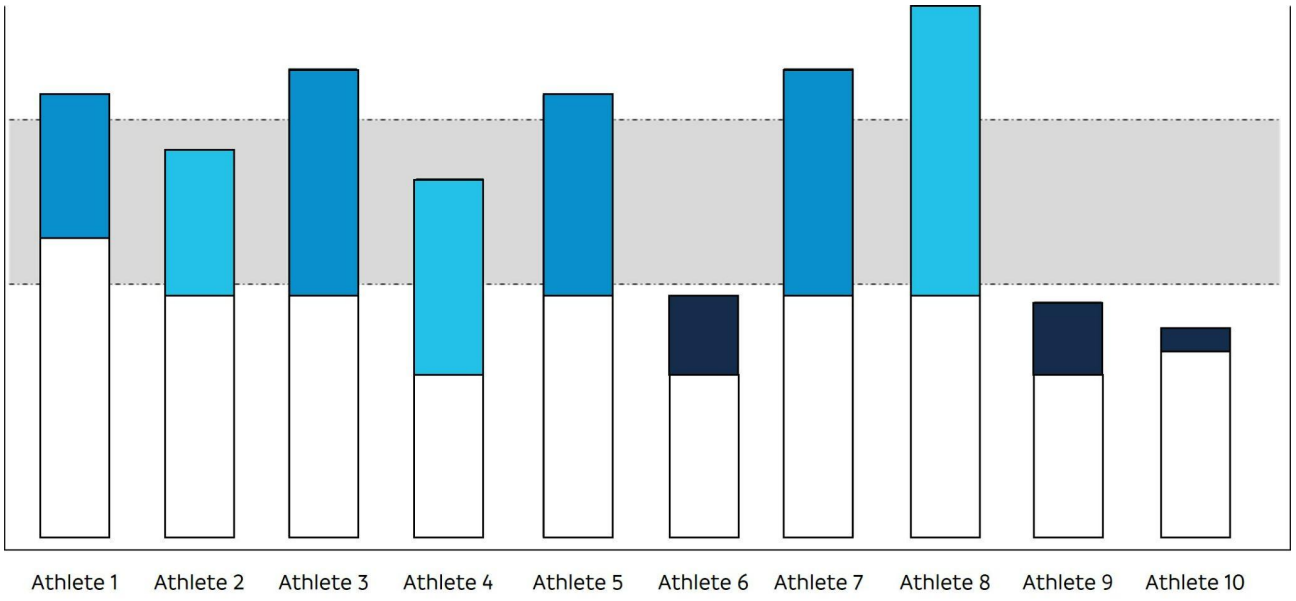
	Total distance	8-12 km/h	12-16 km/h	16-20 km/h	Intense distance	Acceleration	Deceleration	TRIMP	Pse session
Central									
Athlete 2	4580	3250	1000	320	100	34	30	232	505
Athlete 3	4890	1890	2000	500	500	50	55	213	332
Athlete 4	5400	3000	1000	800	600	34	32	199	406
Lateral E									
Athlete 6	4590	3500	500	545	245	32	36	205	399
Athlete 7	6544	3400	2144	550	450	44	45	198	456
Athlete 8	4356	2900	1100	256	100	47	50	189	434
Averages									
Athlete 10	6545	3500	2000	545	500	39	41	233	499
Athlete 11	4455	2800	1000	400	255	38	38	221	501
Athlete 12	3439	2400	539	400	100	43	46	188	403

Gambling-related			
60-75%	76-85%	86-95%	96-100%

Source: own elaboration.

In the first example are the *performance* metrics for various positions as they relate to actual match performance. We can note different colors for each variable that generates a *red flag*, i.e. those indicators that stand out positively or negatively. This helps to interpret the information and to make decisions.

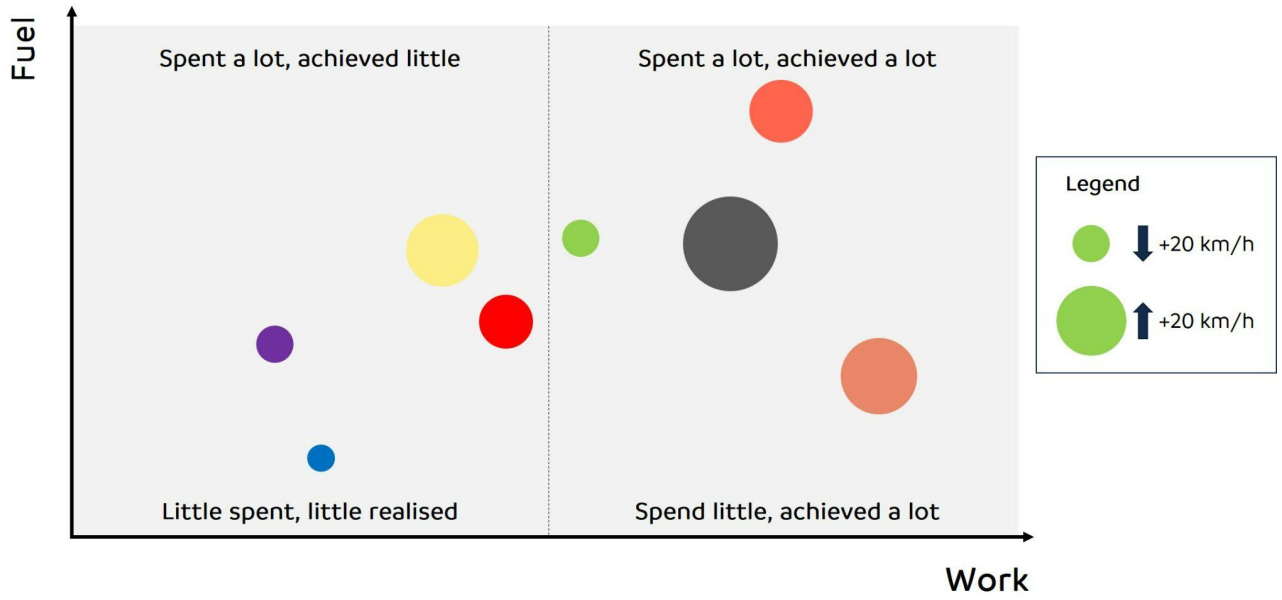
Figure 3: Information on "recurrent complaints" from athletes



Source: own elaboration.

In the second example, the above graph may represent a recurrent complaint case, in which the athletes who reported this condition are the ones with reddened columns, shown by exceeding the gray band representing the response pattern (lower and upper limit; remember Module 2?). This makes it more visual for the coaching staff, making it easier to highlight pertinent information.

Figure 4: Efficiency graph, ratio of external load to external load



Source: own elaboration.

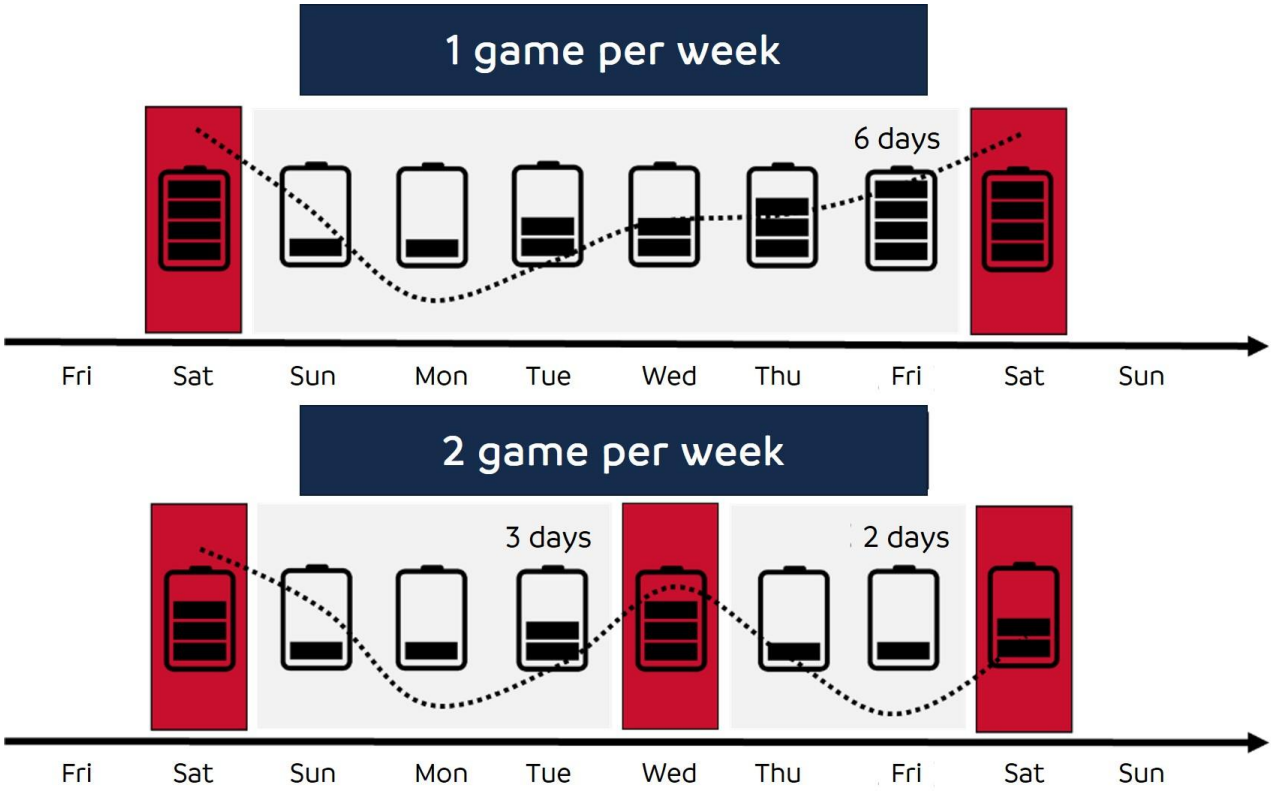
In this last example, in the so-called efficiency graph, the *red flags* can be shown with several training variables at the same time. Drawing a comparison between the internal load (fuel) and the external load (work), it is possible to highlight, in a didactic way, the athlete who "spent" the most fuel and "worked" the most in training, as well as the one who "spent" the least and "worked" the least. As additional information, the size of the circles indicates those athletes who ran more than 20km/h, which facilitates the identification of the *red flags*.

Have you ever thought that, in order for this information to make sense, it is necessary that the data "communicate with each other"? The fact is that it is humanly impossible to analyze countless variables quickly enough to anticipate post-injury, pre-training, pre-game and other situations. Today's technology allows the synchronization and automation of this data, to the point of generating fast and accessible results for the members of the coaching staff.

Unit 4.2 Recovery strategies

In order for the athlete to give a great performance and complete a full season of training and games, it is necessary to **educate, guide and plan for best practices and recovery strategies**. Below is a representation of a very common weekly routine in the world of soccer:

Figure 5: Analogy between battery power and athlete's level of readiness



Source: own elaboration.

To use an analogy relating to battery power, an athlete's level of readiness fluctuates throughout a competitive week. After each completed match, the athlete is left with very little energy due to the **physical** and **mental** toll of the match. Keep in mind that, especially in 2-match per week situations, the athlete often does not recover 100% to be able to perform at a high level in the next match.

Given this challenging fact, the strategy of **rotation in matches (called player rotation)** becomes essential for the preservation of the athlete's health and the maintenance of *performance*. In many cases, "playing the whole team" in a given match or stage of competition can generate the necessary recovery for the player to return to 100% of his level of preparation.

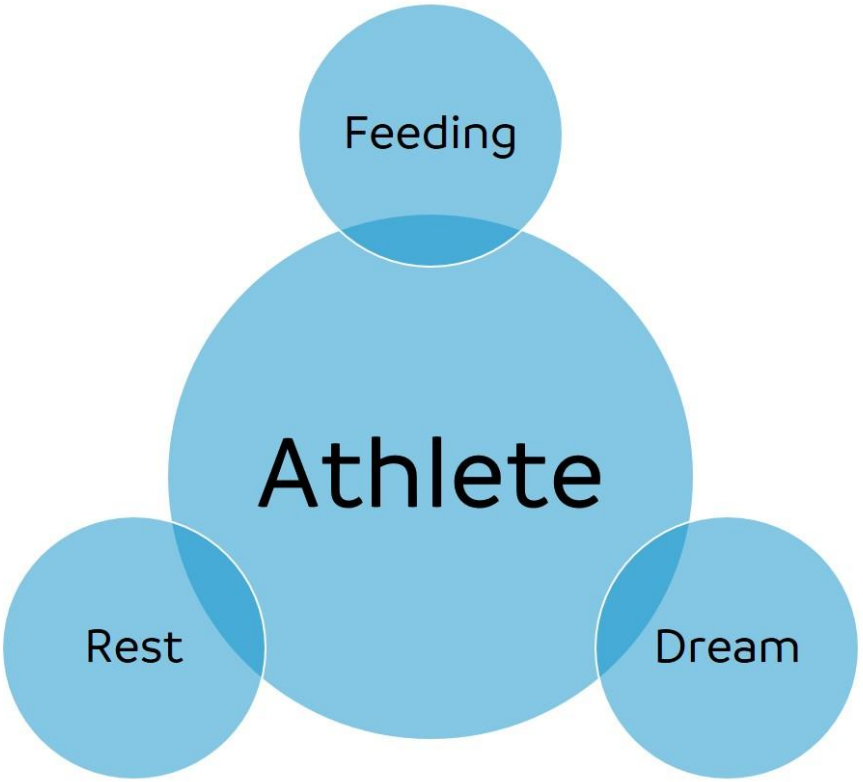
Some criteria that can be analyzed in order for the rotation strategy to be effective:

- Number and sequence of matches;

- Performance of the athletes in sequential matches;
- Importance of competitions;
- Team performance in competitions;
- Distance between match locations;
- Alignment of the technical staff with the board of directors.

However, before any intervention, the athlete must be aware that the body is his working tool and needs to be fully functional to play soccer. Therefore, respect for the routine of healthy **eating**, constant **hydration**, **rest** between workouts/matches and good **sleep** habits should be the pillars of his sports career.

Figure 6: Fundamental foundations for a soccer player's sports career



Source: own elaboration.

Individualized diet based on specific objectives, compliance with meal schedules, hydration and supplementation, and a focus on the response to training or matches are the

habits of excellence when we talk about nutrition linked to the technical, physical preparation and health areas.

In addition, the importance of rest between training periods (morning/afternoon) and during travel and away games is crucial to restore the body as much as possible, given the often short turnaround time.

Last but not least, sleep is the main restorative of the physiological, hormonal, emotional and cognitive aspects of the athlete's being.

The athlete's body must also recover through the body's own natural processes.

Thus, we highlight three pillars that should guide recovery practices:

- Respect the **athlete's routine**;
- Develop **competitiveness** and create a culture of sacrifice;
- Plan recovery strategies **according to the athlete and circumstances**.

Therefore, in order for the athlete to withstand this high work demand, basic recovery responses of the body must be a priority before applying any recovery strategy, which will be complementary to the whole.

In the most extreme cases, where the demands of matches and travel do not allow for complete basic recovery responses, then *recovery* strategies are welcome. Read on, because we will explain this in more detail below.

What strategies are available?

Cryotherapy

Cryotherapy or ice water immersion is a very common recovery strategy in sport and, over time, has generated much discussion about its efficacy. By **immersing parts of the body (lower limbs) or even the whole body**, cryotherapy aims to stimulate physiological responses that contribute to the athlete's recovery.

Physiological responses include changes in heart rate, peripheral resistance and blood flow, as well as changes in skin, core and muscle temperature (Wilcock; Cronin; Hing, 2006). The physiological responses of changes in blood flow and temperature can, in turn, have an effect on inflammation, immune function, muscle pain, and perception of fatigue (Halson, 2013).

Several experimental designs have been proposed for the use of cryotherapy involving: temperature of the medium, exposure time, body region exposed, type of medium (clothing/water/ice), subjects tested, intervention time, and others (Montano *et al.* , 2018; Tipton *et al.* , 2017).

Although there is variation in cryotherapy protocols, **a duration of 5 to 10 minutes, between 10 and 15 ° C is recommended (**McGorm *et al.,* 2015). Individual approaches should be used, as eventually some athletes may not be able to withstand this type of recovery strategy.

In the end, what do we know so far?

↘ Core, skin and muscle temperature

↘ Muscle blood flow.

↘ Nerve transmission

↘ Edema

↘ Training adaptations (?)

↘ Muscle damage (?)

Muscle function

Hydrostatic pressure (?)

In the face of certainties and doubts, the factor that provides the most answers to questions about the athlete's recovery routine is the **decrease in pain perception**. It has been suggested that the placebo effect (that psychological effect of believing that it works even if it has no proven direct relationship) of cryotherapy reflects positively on the athlete's perception of pain, mainly due to the **analgesic and anti-inflammatory characteristic** of the low-temperature medium.

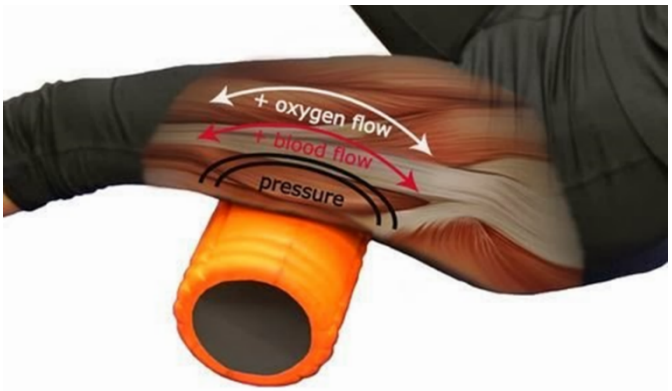
The most important thing is to adopt an individualized approach, focusing on the right times to apply cryotherapy (training and matches) to make this strategy as effective as possible.

Self-myofascial release

Self-myofascial release (SMR) has become a popular form of release or massage routine, particularly among working professionals in sports. Due to this popularity, self-myofascial release materials can be easily found in soccer clubs and gyms.

Despite this, there are still several unknowns about its effectiveness as a recovery strategy. Recent studies, analyzing different *recovery* protocols and interventions, still need concrete results to elucidate some questions.

Figure 7: How myofascial release works



Source: [Untitled image about myofascial release], s. f., https://bit.ly/3jBDBvX

During SMR, people use their own body mass to exert pressure on soft tissues. The movements exert ample and direct pressure on the soft tissue, stretching it and generating friction between it and the massage tool.

It can be considered a form of self-induced massage, because the pressure exerted by the implement on the muscles is similar to the pressure exerted on the muscles by manual manipulation by a masseuse, for example. Supposedly, SMR contributes to blood flow, oxygenation, alignment of myofascial structures and relaxation.

As a relatively new practice in sport, science is still investigating the effects and relationships of SMR to recovery. For example, there is insufficient evidence to claim that SMR contributes to flexibility, range of motion, and *performance*, primarily in high-performance athletes (Cheatham; Stull, 2018; Cheatham; Stull; Kolber, 2018; Markovic, 2015; Mohr; Largo; Goad, 2014; Healey *et al.*, 2014; Sullivan *et al.,* 2013).

However, an important finding is that SMR appears to have a positive effect on the **athlete's perception of pain and fatigue** (Gregorio *et al.*, 2015; Mac Donald *et al.,* 2014). As with strategies such as cryotherapy, mentioned above, we should use an individualized approach in soccer routines.

Active recovery

Very common in soccer practices, active recovery consists of **low-intensity exercises to help eliminate metabolites and minimize delayed muscle soreness**. It should be noted that there is a difference between active recovery performed immediately after training and that performed the following day.

Still very confusing to some, using active recovery to help remove lactate the next day is meaningless, as the body itself removes lactate 60 to 180 minutes after exertion. Clearly, lactate removal should not be considered a marker of enhanced recovery, as lactate does not stimulate fatigue as was once thought some years ago.

Three very important tips for prescribing active recovery as a recovery strategy:

a) Active recovery for at least 15 minutes, between 30 and 60% of VO_2 max, seems to improve blood lactate clearance or accelerate pH recovery immediately after exercise (Koizumi *et al.* , 2011);

b) During interval training interspersed with long intervals (> 30 s), active recovery is appropriate (Hausswirth; Mujika, 2013);

c) During interval training at supramax speeds, interspersed with short intervals (<15 s), passive recovery is more appropriate (Dupont; Blondel; Berthoin, 2003).

As a routine, especially after a game, performing other activities as a form of active recovery is recommended, avoiding a monotonous workout and giving different stimuli to the body (biking, swimming, rowing, etc.) while always controlling the load of the activity.

Compression equipment

In the last decade, the emergence of new equipment to help speed recovery after training and match play has brought very practical options to the soccer routine. Surely, you have observed athletes using compression equipment and have noticed the popularity of this strategy.

Due to its practicality and ease of transportation, many clubs have adopted it and take the equipment to away games to use it in hotels, dressing rooms and even on airplanes during travel.

Compression equipment **can consist of clothing or even pneumatic boots**, which are used for both lower and upper limbs. The function is to generate a compression effect similar to the muscle pump of the legs and arms (Brown *et al.*, 2017; Hill *et al.*, 2014).

The principle of this strategy is to **facilitate blood circulation by accelerating nutrient delivery and metabolite elimination, as well as to improve post-exercise edema, delayed muscle soreness and muscle damage** (Brown *et al.*, 2017; Hill *et al.*, 2014).

Figure 8: Graphical representation of blood circulation

Source: own elaboration.

As with self-myofascial release, more studies need to be conducted within the high performance sports environment to confirm the physiological effects on athlete recovery. The fact is that **the athlete's perception of pain and well-being appears to be lower** after wearing compression clothing or boots (Hill *et al.*, 2014).

In any case, some recommendations for the effective use of this strategy can be highlighted:

a) Be careful when wearing compression garments when sleeping at night, as it can increase body temperature, affecting the sleep cycle (French *et al.* 2008);

b) It is recommended that compression garments be worn during long flights, in addition to walking and stretching on the plane. The aim is to aid blood circulation, preventing the formation of clots and, in extreme cases, the risk of deep vein thrombosis (although uncommon for athletes) (Bartholomew; Schaffer; McCormick, 2011);

c) It is recommended that the specifications of compression clothing (pants) be verified, in order to limit the pressure exerted on the ankle (to 8 mmHg) and mid-thigh (to 18 mmHg);

d) In order for the compression garment to fulfill its purpose, it is important to ensure that the material is at least 18% elastic material (these specifications can be found on the product packaging or from the manufacturer).

Importance of sleep

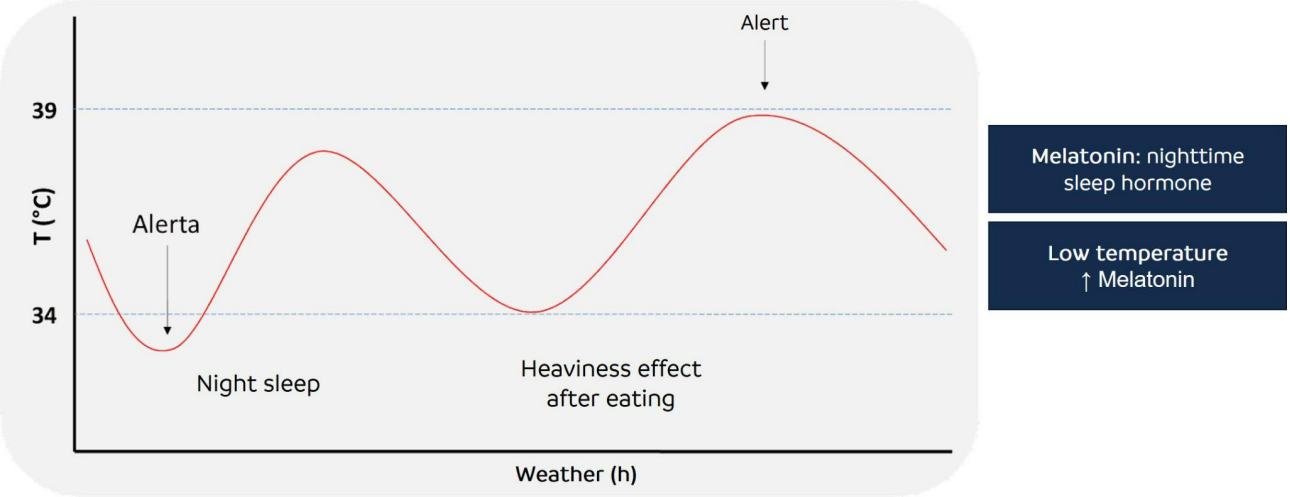
Sleep is recognized as a fundamental component of an athlete's well-being and performance, particularly during the competitive period. One of the fundamental aspects of an athlete's recovery is achieving sufficient quantity and quality of sleep.

Did you know that **64% of athletes report sleepless nights on at** least one of the days prior to major competitions in the last 12 months (Juliff *et al.*, 2015)?

And that **82% of athletes report problems sleeping before competition** (Juliff *et al.*, 2015)?

The relationship between exercise and sleep has already been studied, suggesting that some factors may affect sleep and recovery, such as the athlete's circadian rhythm, load and/or time of day for physical exercise (Costa *et al.,* 2018a; Costa *et al.,* 2018b; Vitale *et al.* , 2017).

Figure 9: Relationship between sleep and exercise



Source: own elaboration.

Although there is still no consensus on the amount of sleep an athlete should have to maintain optimal performance (Sargent *et al.*, 2014), **athletes who sleep less than 8 hours per night appear to be more likely (1.7 times) to suffer injuries** (Milewski *et al.*, 2014).

On the other hand, we know that the rule of 8 hours of sleep per night for everyone is not entirely true. This recommendation is very much linked to the general population that does not have the peculiar exhausting routine of a high performance soccer athlete. In fact, there are different profiles, such as the so-called long sleepers and the short sleepers.

Long sleepers are those individuals who need more hours of sleep (+9 hours) for their bodies to recover for the next day. On the other hand, **short sleepers** are those who need sleep periods of 6 hours or even less, which still allows the body to recover. This condition is **genetically determined** and thus the determination of the quantity and quality of sleep must be individualized.

To **detect and monitor sleep disorders**, it is important to monitor sleep habits and perceptions through **subjective and/or objective measures** (Myllymaki *et al.*, 2011). The recommended equipment to monitor sleep is polysomnography, which uses electrodes to monitor physiological parameters such as brain, muscle, cardiac and respiratory activity.

Polysomnography is particularly useful for investigating sleep disorders, including respiratory disorders. However, polysomnography is relatively expensive, requires specialized equipment and is impractical for use with athletes.

Figure 10: Polysomnographic device

Source: [Untitled image about polysomnographic device], s. f., https://bit.ly/3x7Axuz

Actigraphy, on the other hand, uses accelerometers placed in mobile devices (cell phones) to record movements that estimate the quality and quantity of sleep. Actigraphy is cheaper, non-invasive and can be used in training routines/matches. Thus, actigraphy is the most accessible method to objectively monitor the sleep of athletes during the night.

Figure 11: Clock used for actigraphy

Source: [Untitled image about polysomnographic device], s. f., https://bit.ly/3lmLjdT

The following are practical sleep practice recommendations to guide athletes:

a) **Avoid stimulating beverages** before bedtime, such as alcoholic beverages or those containing caffeine. These may affect Delta and REM (*Rapid Eye Movement*) sleep phases;

B) **Avoid constant exposure to artificial light.** The brain, receiving light information through vision, tells the body that it is daytime and that it needs to stay awake;

c) Eating **light meals** before going to bed;

d) **Avoid technological devices** (cell phones, tablets, televisions) right before going to bed. The so-called blue light stimulates brain activity;

e) Keep the **environment dark, quiet** and with a temperature between 18 and 22 ° C;

f) Create a **pre-bedtime routine**, so that no extra activity will make you lose sleep: prepare the bed in advance, brush your teeth immediately after the last meal, set the alarm clock to go to bed and go to sleep;

g) Create **habits of *power naps*** around lunchtime, lasting 20 to 30 minutes, so as not to enter a deep sleep phase, as this is likely to lead to a lethargic state for the rest of the day.

Last but not least, sleep as a recovery strategy has one of the most sought-after goals **for** athletes: **mental *recovery***. As the body is totally connected to the mind, being the guide that directs our actions and behaviors, giving due importance to sleep is a prerequisite for *performance* in soccer.

Irregular sleep directly affects **mood, concentration, alertness and cognitive functions**, which is totally counterproductive to the optimal level of preparation a soccer player needs on the field.

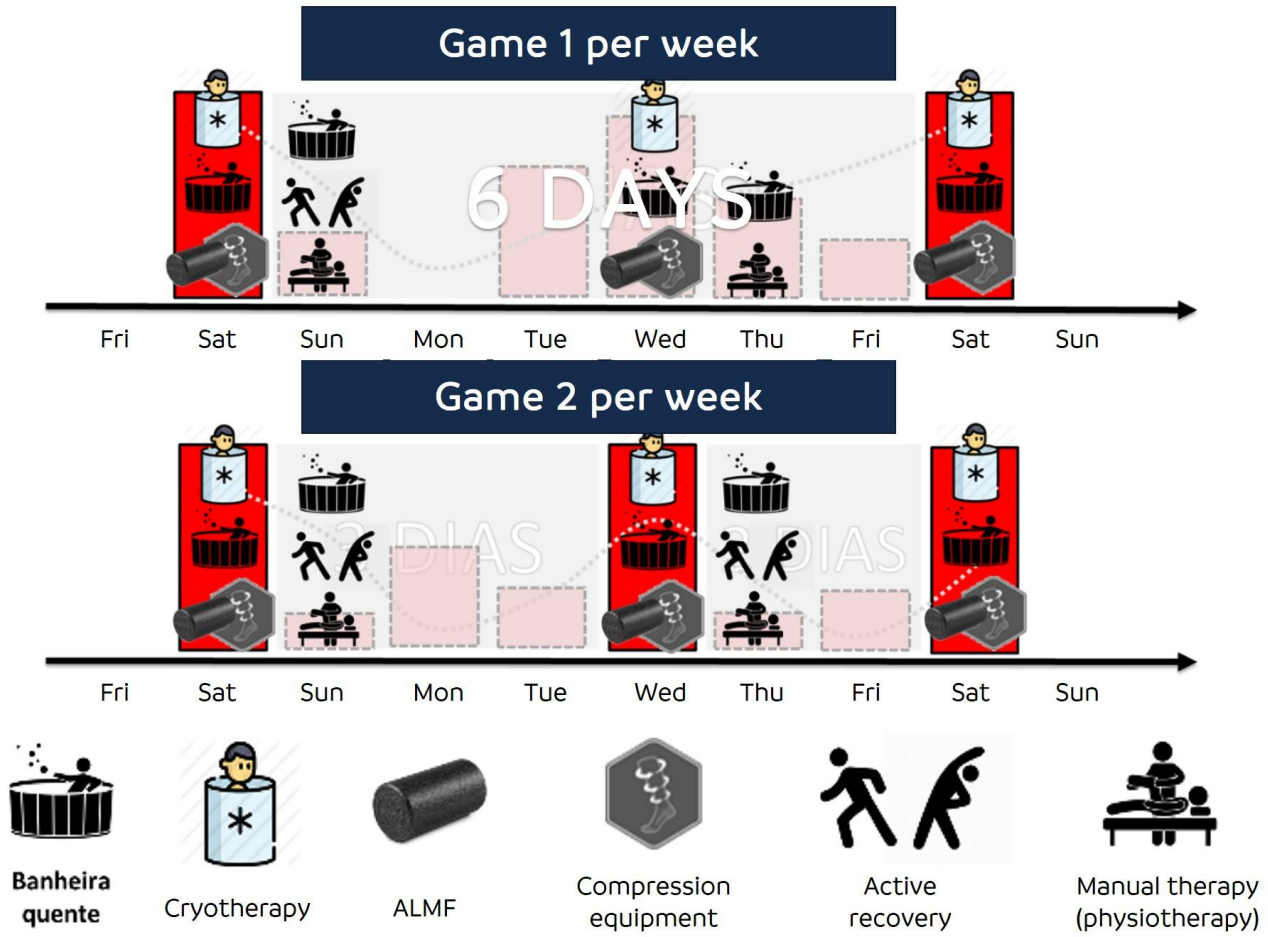
Practical applications - Match week with planned recovery strategies

To close this Module 4, we will look at a practical example of how to plan recovery strategies throughout the week, with different load characteristics and numbers of matches.

In the same way that we plan training loads and content, strategies can also be selected and implemented according to the **day of the week** (training or match), the **circumstance**

(home or away match) and the **availability of resources for *recovery*** (equipment and personnel).

Figure 12: Comparison between weeks with 1 and 2 matches and resources



Source: own elaboration.

In the first situation, **a 1-match week**, note that the training and match loads (represented by the red columns) determine which days will be assigned to interventions.

Depending on the availability of resources and infrastructure (e.g., home games), recovery strategies can be more elaborate or simplified. On heavier load days, such as Saturday and Wednesday, athletes are encouraged to perform full *recovery* due to the high demand.

In the second situation, **with 2 matches in a week**, the biggest workloads are the matches themselves. And so, the recovery strategies are directed to the day of each match and also to the following day (day +1).

In congested weeks like this one, with few days between games, the focus is on accelerating the recovery process of the athletes, especially those most needed by the coach (starters).

In practice, this is an extremely current approach to individualizing recovery strategies. As each athlete responds in a particular way to training loads and matches, considering their biological individuality, their role on the field and the circumstances of the season, it is understood that they must follow a specific recovery schedule.

Well, then.

We have reached the end of Module 4 and the end of the course physical preparation and scheduling for professional soccer: planning and practical applications.

We would very much like for you to reflect on everything we have discussed so far and make a thoughtful analysis of what makes sense or not for your performance in the field of physical preparation. It is essential that you visualize the content, connecting it with your reality at work, while always respecting the concepts of sports training that guide this specific area of soccer.

We hope that this course has been very beneficial for your training and that it has awakened new ideas and solutions for your day-to-day challenges in professional soccer.

See you soon!

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