‘Post-rehabilitation phase’ in professional football: are we optimising player support after return-to-play?

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BD was responsible for the conception and writing of the editorial. DH and JA contributed and provided supervision and feedback throughout. All authors critically reviewed the manuscript and approved the final version. BD is the guarantor.

Acknowledgements

Not applicable.

Conflicts of Interest

The authors declare no competing interests.

Funding

No funding was received for this research.

Ethical Considerations

Not applicable. No data was collected as part of the editorial.

Consent to Participate

Not applicable.

Data Availability

Not applicable.

THE IMPORTANCE OF RETURN TO PLAY DECISIONS

The decision to progress or delay a player's return to play (RTP) from injury is a constant balance between risk and reward. A player returning early could have a significant performance impact on the team, however, there is the possibility of a simultaneous increase in the risk of subsequent injury.[1] Previous injury is cited as a key factor in possible future injury[2] raising two important questions: (1) When does rehabilitation truly end? and (2) Are we optimising player support post-RTP? Following the emergence of rehabilitation frameworks[3-5] the aim of this editorial is to highlight the importance of individualised post-RTP monitoring and to propose the introduction of a 'Post-Rehabilitation Phase'. Furthermore, common injury definitions are presented (box 1) and potential future research directions will be discussed to best inform player support following rehabilitation.

Box 1 Injury Definitions
Injury Any physical complaint sustained by a player that results from a football match or football training, irrespective of the need for medical attention or time-loss from football activities. An injury that results in a player receiving medical attention is referred to as a ''medical-attention'' injury and an injury that results in a player being unable to take a full part in future football training or match play as a ''time-loss'' injury.[6]
Index Injury Chronologically the first injury to occur or any subsequent injury that is clinically unrelated to the previous index injury.[7]
Subsequent Injury Any injury that is clinically related to the index injury that occurs prior to or following a player's return to participation. Further subcategorised into 16 clinical categories including reinjury, acute exacerbation, continual exacerbation, sporadic exacerbation.[7] A full table of clinical categories can be found in online supplementary material 1.
Reinjury A category of subsequent injury defined as an identical injury (i.e., same side, location, structure and type) that occurs following a player's return to full participation after an index injury.[6 7]

SUBSEQUENT INJURY

Subsequent injury is a poorly reported and researched area within rehabilitation.[8] Despite previous injury increasing the susceptibility for subsequent injury[8] associations are rarely considered even though reinjury rates for specific injuries in professional football are high. For example, 12-43% for hamstring injury, 31-50% for groin injuries and 30-40% for knee sprains.[2] This could be attributable to inadequate rehabilitation, premature RTP[2] or a lack of

consideration to the physical, technical and cognitive demands during final rehabilitation phases. Nonetheless, any subsequent injury places a significant burden on the player and medical departments due to longer rehabilitation timeframes, additional time-loss and the psychosocial impact it can have.

In the period following RTP subsequent injury-risk is heightened with a 'one month risk decay' of non-contact injuries reported in professional football.[9] Following return, initial risk of non-contact subsequent injury was about two times higher than baseline. This risk diminished by half after approximately 25 days and levels off afterwards.[9] The severity of the index injury should be considered with severe injuries showing a significantly increasing injury risk within the first ten days and remaining relatively high thereafter.[9] Importantly, the continuous hazard curve of non-contact injury risk shows a decline towards four weeks after RTP[9], supporting a 'post-rehabilitation phase' that requires careful additional attention regarding player management and providing practitioners with a time-based approach. Further insights are required into the time course of injury risk accounting for exposure hours and other influential contextual factors, such as injury history, playing demands and index injury severity.

RETURN TO PLAY FRAMEWORKS

There has been a paradigm shift towards competency-based progressions in RTP frameworks. The notion that RTP is a single decision point in time has developed into the concept of an evolving continuum throughout rehabilitation, from the onset of injury to full RTP. On-field rehabilitation (OFR) frameworks have been developed,[3-5] including a football specific return-to-performance framework.[4] This framework[4] includes a progressive multistage process commencing with a diagnosis phase, an acute phase and then progression through gym and grass phases. In current frameworks, these 'grass phases' represent the final stages of rehabilitation and are highlighted as being important to prepare the athlete for re-entry into sport and where the overlap between rehabilitation and meeting RTP demands occurs.

INTRODUCTION OF THE POST-REHABILITATION PHASE

The need to 'consider injury history' and 'monitor injury specific criteria' are acknowledged[4], however, specific player monitoring post-RTP is not considered in detail. Therefore, following the RTP pathway[4] an additional 'post-rehabilitation phase' is proposed (Figure 1). With

consideration to the performance demands of professional football, this phase is designed to run concurrently alongside grass phases 4-6, providing optimal support to players post return to training (RTT) and increase the awareness of practitioners to advance specific programming based on subsequent injury risk assessments.

This proposed phase incorporates the role of subsequent injury mitigation programming, acknowledging the risk of reinjury and injury to alternative sites. The importance of monitoring and designing training programmes, that are specific to the rehabilitation site alongside alternative sites, is highlighted. Specific monitoring tools, such as GPS data, subjective questionnaires and neuromuscular strength/power diagnostics[4 5], can assist practitioner decision-making in managing training adjustments in accordance with the player's response to increased demands post-RTT. This can help evaluate the tolerance of the rehabilitation site and the general fitness/fatigue status of the player, aiming to minimise further injury risk.

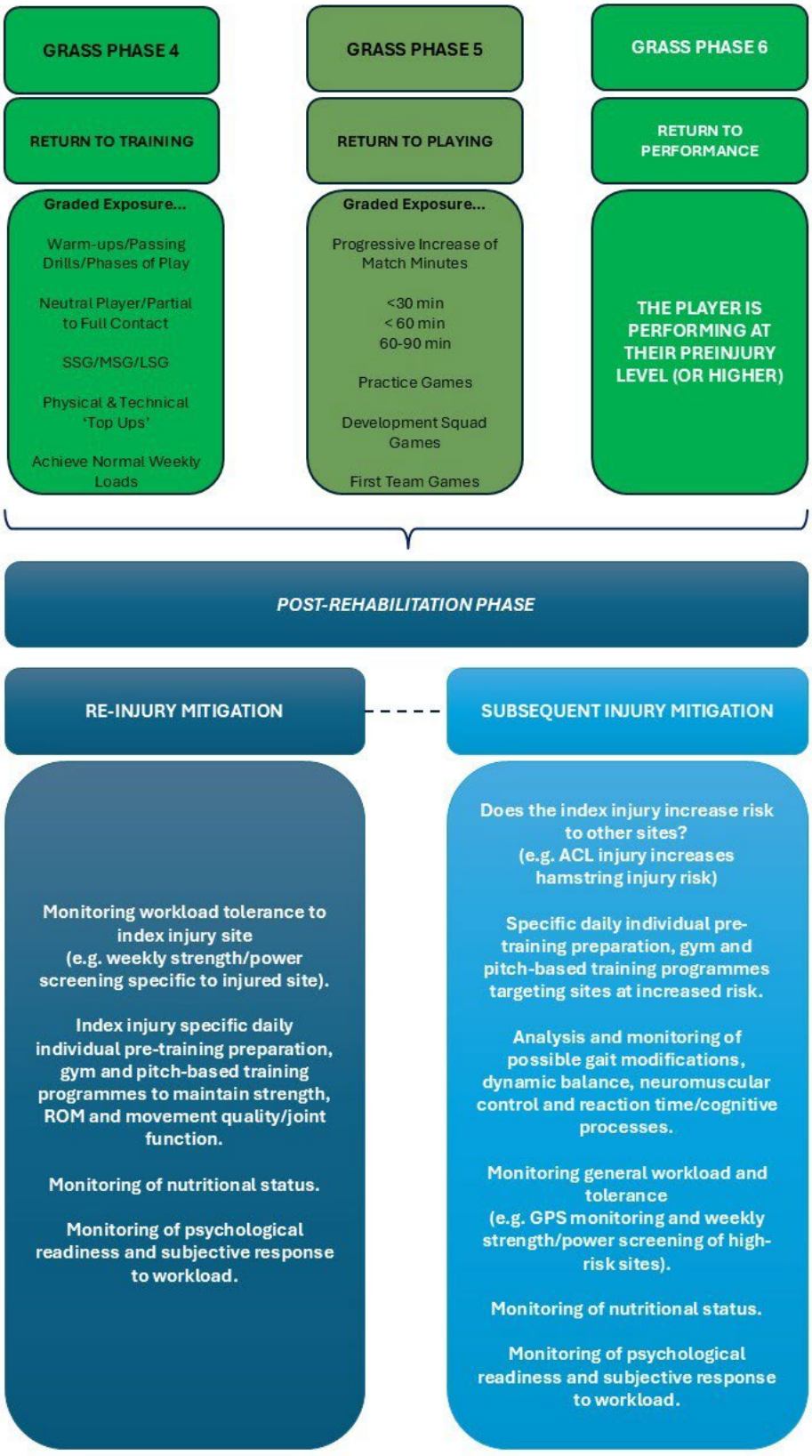

Figure 1 Proposed 'Post-Rehabilitation Phase' following return-to-play. SSG = small-sided games, MSG= medium-sided games, LSG = large-sided games, ROM = range of motion, ACL= anterior cruciate ligament.

FUTURE DIRECTIONS

To inform and develop a contemporary approach to the 'post-rehabilitation phase', further research is required to understand the risk of subsequent injury, and inter-injury relationships, to inform tertiary injury prevention programming.[7 8] As part of the development of the 'Post-Rehabilitation Phase', workload and availability monitoring to assess a potential association between post-RTT load and subsequent injury risk would be beneficial. This may help inform practitioners as to possible suitable loading strategies post-RTT. Investigating the influence of contextual factors, such as phase of season, squad shifting (i.e., transition of players between first team and development squads), player status (i.e., key, squad or development player), positional switching (i.e., winger to forward), coaching team influence, style of play, player expectation, game model[10], and the possible association with mechanisms of subsequent injury could be beneficial.

Furthermore, a greater understanding of subsequent injury risk can allow a possible timeframe for the 'post-rehabilitation phase' based on the severity of the index injury. This can help assist practitioners in developing injury specific monitoring and loading strategies for both reinjury, and possible subsequent injuries, to alternative sites. Although the current proposed phase is applicable to a football specific framework, there is scope to apply and investigate this further for a range of sports and cohorts.

SUMMARY

It is important to continually develop rehabilitation frameworks to ensure they are viewed as a continuum reflecting the evolving demands of professional sport. The notion of 'step by step phases' should be combined with the practitioner's ability to 'blend' and add phases to reflect the dynamic nature of injury, the demands of the sport, individual responses to injury/workload and influential contextual factors. The consequences of subsequent injury following a period of rehabilitation can be far-reaching for the medical department, the club and the player. It is critical to acknowledge that the rehabilitation process does not have a definitive endpoint, and the ever-changing nature of risk factors requires further consideration post-RTP. The development of the 'post-rehabilitation phase' is, therefore, vital to help reduce subsequent injury risk within professional sport.

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