

## Strategies and Discussion Around Workload Management in Baseball

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### Introduction

With recent advances and growth in performance technology, attention has shifted toward the workload management of athletes. In 2022, the ACSM worldwide survey of fitness trends ranked wearable technology as the number one fitness trend of the year.<sup>1</sup> In professional baseball, player workload has traditionally been measured by pitch counts, inning limits, or games appearances. Advancements in athlete monitoring, digital video, marker-less motion capture, and embedded stadium technology have begun to change the way baseball movements are viewed and understood within training. This article provides insight into workload management strategies to promote best practices among practitioners.

### Developing a Fatigue Management System

Monitoring practices are beneficial to evaluating player progress within training programs and competition. Effective workload management can detect fatigue, monitor performance capacity, inform injury risk, and be applied to daily recovery interventions.<sup>2,3,4</sup> As a result, increasingly scientific approaches are being used to develop training programs and help prevent injury.

Despite the growing number of internal and external load measures available, few methods of quantifying athlete workload have strong scientific support.<sup>3,4</sup> Experimental approaches are being developed to address the added complexity of interrelated performance measures for sports like baseball. For example, in-depth analysis is required to evaluate the workload of pitching or hitting in relation to anthropometric measurements, mechanical efficiency, arm angle, elbow-shoulder torque, hip-shoulder separation, and heart rate measures. Indeed, the ultimate goal for a health and performance staff should be progressing through the exploratory stages of workload tracking in favor of sustained organizational systems that continually inform training.

### Applying Workload Management Strategies

From a scientific perspective, managing workload relies on the interaction between external load (work

performed) and internal load (physiological and psychological responses). For example, internal load responses (e.g., heart rate, rate of perceived exertion, psychometric profile, blood lactate, and other biochemical, hormonal, and immunological assessments) may be tracked with external load variables (e.g., force and power outputs, speed, acceleration, and time-motion analysis) to establish effective ranges for health and performance.<sup>3</sup> The use of MLB in-stadium motion capture data is an example of noninvasive data collection, including distances covered, running speed, and positioning.<sup>5</sup> Game data such as bat to ball contact and throwing velocities may also be accounted for as performance metrics.

As presented by Windt and Gabbett,<sup>6</sup> athlete monitoring begins by measuring external workload. The most common approach to workload tracking has been the acute to chronic workload ratio (ACWR). Other factors that influence load tolerance may also be considered, including age, injury history, strength, and fitness. Next, internal and external load measurements should be compared to inform future training prescriptions. Lastly, perceptual and well-being factors like stress, anxiety, and sleeplessness should be noted to determine player readiness.<sup>6</sup>

### Comprehensive Approaches to Player Readiness

Readiness is key to sustained athletic performance. As defined, readiness is “a condition where an athlete has no impairment of physical performance, no mental fatigue, or excessive psychological distress.”<sup>4</sup> It is important for practitioners to recognize that fatigue extends beyond the physical aspects. Fatigue research highlights the interaction between physiological and psychological factors, which are related to both conscious thought (e.g., effort, drive, perception) and the subconscious avoidance of catastrophic injury.<sup>7,8,9</sup> From a workload perspective, psychological factors have been suggested to impact in-game heart rates among professional pitchers.<sup>10</sup> For practitioners seeking information about player readiness, daily psychometric surveys are a valuable addition to a comprehensive workload management approach.

## Conclusion

In baseball, workload extends beyond the game itself, including practice, the weight room, and frequent travel. As a result, to fully quantify external workload likely requires a combination of technologies and approaches. A goal of workload management is to identify and prevent high-risk conditions that may result in injury. This lends support to comprehensive testing and evaluation within performance programs, including the assessment of strength levels, biomechanics, and on-field movement strategies. By understanding fatigue and workload management, practitioners will be better equipped for conversations with players and other members of the performance team.

## About the Author

Eric McMahon is the Coaching and Sport Science Program Manager for the National Strength and Conditioning Association (NSCA) in Colorado Springs. He joined the NSCA staff in 2020 with over 15 years of coaching experience, including roles with the Texas Rangers, Milwaukee Brewers, and the MLB Europe programs. McMahon holds a master's degree in Exercise Science from Springfield College (MA), and a bachelor's degree in Biology from St. Lawrence University (NY). He also completed a Certificate Course in Data Analytics from Cornell University. Eric is a 20-year member of the NSCA and credentialed as a Certified Strength and Conditioning Specialist with Distinction (CSCS\*D) and Registered Strength and Conditioning Coach with Distinction (RSCC\*D).

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