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“Assessing Dominant Shoulder Range of Motion and Strength in Baseball Pitchers: What Does Pitch Count Tell Us?”

Objective: Our objective is to investigate shoulder range of motion (ROM), external rotation (ER) and internal rotation (IR) strength, scaption strength and grip strength pre and post live-game outings with variable pitch counts to offer better insight into developing injury risk assessment and return-to-play guidelines tailored to individual pitch loads.

Introduction: The overhead throwing motion in baseball induces significant mechanical stress throughout the throwing arm. The cumulative stress involved in baseball pitching has been associated with physical changes in throwing arm metrics – including shoulder ROM, shoulder rotational strength, scaption strength, and pinch strength. Chronic deficiencies in these metrics have been associated with higher rates of dominant upper extremity injuries. Investigations into the acute neuromuscular alterations seen throughout a pitching outing have shown decreases in IR ROM as well as ER strength. Grip strength has also been shown to decrease overall throughout a six inning start. While these studies have demonstrated the acute changes in throwing arm metrics, these changes are tied to either fixed innings or number of pitches thrown, simulated game environments, or both.

Methods: Our study included 3,587 collegiate pitchers over a total of 28,616 games pitched. The ArmCare sensor and phone application was used to collect ROM and strength data from individual pitchers after warming up but before their live game outing and then following their pitching outing.

Results: For all the strength variables (ER, IR, scaption, and chuck pinch), pitchers lost 0.1 lbs of strength every ten pitches thrown ($p < 0.01$). Our ROM variables did not show any significant change with pitch count or pre- and post-game measurements as the variable.

Conclusion: Our findings have established a generalizable rate of strength lost per pitch. This rate can be held as a standard to which individual players can be assessed both mid-game with pinch strength metrics as well as between games to assess their recovery back to baseline strength.