

## TRICK OF THE TRADE:

# Implementation of Interval Throwing Programs for Professional Baseball Players: In-season, Off-season, and Return to Throwing

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America's pastime is made up of complex biomechanical movements. Whether it's swinging a bat, fielding, or throwing a ball, all require the body to have strength and endurance to complete the grind of a full season at the major and minor league levels. In this article we will focus on the need to prepare the body for a full season of throwing.

Every organization has some version of an interval throwing program (ITP) for their players to follow. What is an ITP you ask? It is a progressive, sport-specific regimen that gradually exposes an athlete to the demands they will experience upon a return to the sport.<sup>1</sup> The specifics of ITPs vary in many ways. Some are based on timed intervals, whereas others are based on a specific number of throws at a given distance. A new, popular type is velocity driven (Jager, Driveline), with others relying on the athletes to throw the distances required until they feel "warm." Whichever ITP you choose to follow, these metrics should be considered for it to be successful: position specificity (pitcher, infielders, outfielders, catcher), distance, volume, frequency, and intensity. Other important factors to be considered when constructing a good ITP is the time of year when the program will be used (off-season, pre-season, in-season). This matters because the intent changes. For example, an off-season program generally is lighter effort, distance, and frequency and is primarily utilized to keep the arm moving. A pre-season program is a progressive buildup to one's report date that incorporates position-specific practice and drills. An in-season program is generally daily catch, bullpen warm-up, pre-game prep, position-specific practice/drills, and game play. The last thing to consider are the disciplines that should be involved in the program design. Ideally, you have the luxury of a major league staff collaborating, which could include the team physician, ATCs, PTs, strength and conditioning coaches, and position-specific coaches.

A high amount of focus is placed on the pre-season throwing programs for pitchers due to the high incidence of upper extremity injuries. The intent is that the ITP is used to minimize athletes' injury risk by gradually and progressively preparing their bodies for the stresses associated with throwing. Such stresses are unique and can be replicated only by throwing a ball.<sup>1</sup> Accompanied by a dynamic warm-up prior to each throwing session, ITPs increase cardiac output and blood flow to working

muscles, allowing for increased flexibility and decreased injury risk.<sup>2</sup> An ITP is constructed of a few parts. First, with catch play generally starting at 60 feet and extending out to 150 feet. Long toss (loosely any distance beyond 180 feet) is used to increase throwing endurance, velocity, shoulder strength and range of motion.<sup>3</sup> A crow hop, which is broken down into a hop, skip and throw, is used with these extreme distances regardless of the player's position. The goal is to use the lower body to create momentum, which in turn reduces stress on the shoulder and elbow joints when throwing.<sup>2</sup> Finally, most pitchers conclude their throwing sessions with flat ground. Flat ground is a shorter distance throw that incorporates pitching mechanics and specific pitch types. All of this buildup is in preparation for a pitcher to throw off the mound, which also has a buildup all its own. A sample pre-season buildup is seen in figure 1.<sup>1</sup>

Pitchers have a 34% higher incidence of injury compared with position players in Major League Baseball.<sup>3</sup> An ITP can reduce injury risk but likely cannot prevent it. A comprehensive shoulder strength and endurance program is needed year-round. With injury, there are typically three phases required to return to throwing. Phase 1: decrease pain and inflammation, normalize ROM, begin muscle reactivation, light strengthening, core and hip strengthening. Phase 2: continue to progress movement patterns, increase general strength exercises and manual resistance training, and initiate weight training. Phase 3: initiate plyometrics, progress strength training, full weight room participation, and most important, pass all return to sport/throwing testing (see figure 2). If a player is uninjured, a shoulder maintenance program modeled after phases 2 and 3 should be completed in conjunction with the ITP. One must remember that throwing is also an exercise that must be accounted for in the total workload volume.

When designing and using an ITP in conjunction with a structured rehabilitation program, the athlete should return to full competition status while minimizing any chance of reinjury. The program and its progression should be modified to meet the specific needs of each individual athlete. A comprehensive program consisting of a maintenance strength and flexibility program, appropriate warm-up and cool-down exercises, proper pitching mechanics, and progressive throwing will assist the baseball player in returning safely to competition.<sup>1</sup>

45-FT PHASE	60-FT PHASE	90-FT PHASE	120-FT PHASE	150-FT PHASE
<b>STEP 1:</b> A. Warm-up throwing B. 45 ft, 25 throws C. Rest 5-10 min D. Warm-up throwing E. 45 ft, 25 throws  <b>STEP 2:</b> A. Warm-up throwing B. 45 ft, 25 throws C. Rest 5-10 min D. Warm-up throwing E. 45 ft, 25 throws F. Rest 5-10 min G. Warm-up throwing H. 45 ft, 25 throws	<b>STEP 3:</b> A. Warm-up throwing B. 60 ft, 25 throws C. Rest 5-10 min D. Warm-up throwing E. 60 ft, 25 throws  <b>STEP 4:</b> A. Warm-up throwing B. 60 ft, 25 throws C. Rest 5-10 min D. Warm-up throwing E. 60 ft, 25 throws F. Rest 5-10 min G. Warm-up throwing H. 60 ft, 25 throws	<b>STEP 5:</b> A. Warm-up throwing B. 90 ft, 25 throws C. Rest 5-10 min D. Warm-up throwing E. 90 ft, 25 throws  <b>STEP 6:</b> A. Warm-up throwing B. 90 ft, 25 throws C. Rest 5-10 min D. Warm-up throwing E. 90 ft, 25 throws F. Rest 5-10 min G. Warm-up throwing H. 90 ft, 25 throws	<b>STEP 7:</b> A. Warm-up throwing B. 120 ft, 25 throws C. Rest 5-10 min D. Warm-up throwing E. 120 ft, 25 throws  <b>STEP 8:</b> A. Warm-up throwing B. 120 ft, 25 throws C. Rest 5-10 min D. Warm-up throwing E. 120 ft, 25 throws F. Rest 5-10 min G. Warm-up throwing H. 120 ft, 25 throws	<b>STEP 9:</b> A. Warm-up throwing B. 150 ft, 25 throws C. Rest 5-10 min D. Warm-up throwing E. 150 ft, 25 throws  <b>STEP 10:</b> A. Warm-up throwing B. 150 ft, 25 throws C. Rest 5-10 min D. Warm-up throwing E. 150 ft, 25 throws F. Rest 5-10 min G. Warm-up throwing H. 150 ft, 25 throws

180-FT PHASE	
<b>STEP 11:</b> A. Warm-up throwing B. 180 ft, 25 throws C. Rest 5-10 min D. Warm-up throwing E. 180 ft, 25 throws  <b>STEP 12:</b> A. Warm-up throwing B. 180 ft, 25 throws C. Rest 5-10 min D. Warm-up throwing E. 180 ft, 25 throws F. Rest 5-10 min G. Warm-up throwing H. 180 ft, 25 throws	<b>STEP 13:</b> A. Warm-up throwing B. 180 ft, 25 throws C. Rest 5-10 min D. Warm-up throwing E. 180 ft, 25 throws F. Rest 5-10 min G. Warm-up throwing H. 180 ft, 20 throws I. Rest 5-10 min J. Warm-up throwing K. 15 throws, progressing from 120 to 90 ft  <b>STEP 14:</b> Return to respective position or progress to <b>Step 14</b> in the Flat-ground table to the right.

FLAT-GROUND THROWING FOR BASEBALL PITCHERS	
<b>STEP 14:</b> A. Warm-up throwing B. 60 ft, 10-15 throws C. 90 ft, 10 throws D. 120 ft, 10 throws E. 60 ft (flat-ground) using pitching mechanics, 20-30 throws	<b>STEP 15:</b> A. Warm-up throwing B. 60 ft, 10-15 throws C. 90 ft, 10 throws D. 120 ft, 10 throws E. 60 ft (flat-ground) using pitching mechanics, 20-30 throws F. 60-90 ft, 10-15 throws G. 60 ft (flat-ground) using pitching mechanics, 20 throws
<p><b>Note:</b> All throws should be on an arc with a crow hop. Warm-up throws consist of 10 to 20 throws at approximately 30 ft. Throwing program should be performed every other day, 3 times per week unless otherwise specified by a physician or rehabilitation specialist. <b>Perform each step _____ times before progressing to next step.</b></p>	
<p><b>PROGRESS TO PHASE 2: THROWING OFF THE MOUND</b></p>	
<p>45 ft = 13.7m; 60 ft = 18.3m; 90 ft = 27.4m; 120 ft = 36.6m; 150 ft = 45.7m; 180 ft = 54.8m</p>	

Figure 1

RETURN TO THROWING CRITERIA

	TESTS	GOAL
<b>MOVEMENT QUALITY</b>	Functional Movement Screen	> 1 all movements no asymmetries
<b>RANGE OF MOTION</b>	<i>Shoulder ROM</i> Shoulder ER Shoulder IR Shoulder Total Arc Shoulder Flexion Shoulder Horizontal Abduction  <i>Elbow ROM</i> Elbow Flexion Elbow Extension Elbow Total Arc	< 5 deg asymmetry < 10 deg asymmetry < 10 deg asymmetry  < 5 deg asymmetry
<b>STRENGTH (MICROFET HHD)</b>	Scaption Shoulder ER Shoulder IR Shoulder ER/IR Ratio	> 70%
<b>ENDURANCE</b>	Prone Endurance Test	30 reps @ 2% BW
<b>CLOSED CHAIN STABILITY</b>	Y Balance Test	< 4 cm asymmetry

Figure 2

References

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