

Interval Throwing Program

The interval throwing program is designed to gradually return functional strength, motion and confidence in the throwing arm after injury or surgery. By slowly progressing through graduated distances and speeds, this program aims to return the throwing athlete to pain free competition. Throwing involves the smooth transfer of energy through the body's kinetic chain, which is a linkage between the legs, trunk, shoulder girdle, arm and hand. Improving the strength and endurance of each link in this chain is critical to improving performance and preventing reinjury. The following points should be considered to meet the goals of this program

1. Any return to throwing after injury must include attention to all links in the kinetic chain
2. The chance of reinjury is minimized by a graduated progression of interval throwing
3. Proper warm-up is essential
4. Most injuries result from fatigue
5. Proper throwing mechanics will reduce the chance of injury
6. Baseline requirements for throwing include:
 - pain free range of motion
 - adequate muscle power
 - adequate muscle resistance to fatigue

We recommend following the program rigidly as this will be the safest route to return to competition. During the recovery process you will probably experience soreness and a dull, diffuse aching sensation in the muscles and tendons of the shoulder. If you experience sharp pain, particularly in the joint, stop all throwing activity until this pain ceases. If pain continues, contact your physician.

Weight Training: You should supplement the interval throwing program with a high repetition, low weight exercise program. Strengthening should address a good balance between anterior and posterior musculature (internal and external rotators) so that the shoulder will not be predisposed to injury. Special emphasis must be given to the posterior rotator cuff muscles as these help decelerate the arm after transfer of energy through the kinetic chain. Weight training will not increase throwing velocity, but will increase the resistance of the arm to fatigue and injury. Weight training should be done the same day as you throw; however it should be after your throwing is completed, using the say in between for flexibility exercises and a recovery period. A weight training pattern or routine should be stressed at this point as a maintenance period. This pattern can and should accompany you into and throughout the season as a deterrent to further injury. It must be stressed that weight training is of no benefit unless accompanied by a sound flexibility program.

Individual Variability: The interval throwing program is designed so that each level is achieved without pain or complications before the next level is started. This sets up a progression that a goal is achieved prior to advancement instead of advancing to a specific time frame. Because of this design, the interval throwing program may be used for different levels of skills and abilities, from high school to professional levels. The reasons for being in the interval throwing program will vary from person to person, for example, one athlete may wish to use alternate days throwing with or without using weights in between; another person may have to throw every third or fourth day due to pain or swelling. Listen to your body-it will tell you when to slow down. Again, completion of the steps of the interval throwing program will vary from person to person. There is not set timetable in terms of days to completion.

Warm-Up: Jogging increases blood flow to the muscles and joints, thus increasing their flexibility and decreasing the chance of reinjury. Because the amount of warm-up will vary from person to person, you should jog until developing a light sweat, then progress to the stretching phase.

Stretching: Because throwing involves all muscles in the body, all muscle groups should be stretched prior to throwing. This should be done in a systematic fashion beginning with the legs and including the trunk, back, neck, and arms. Continue with capsular stretches and L-bar range of motion exercises.

Throwing Mechanics: A critical aspect of the interval throwing program is maintenance of proper throwing mechanics throughout the advancement. The use of the crow-hop method stimulates the throwing act, allowing emphasis of the proper body mechanics. This throwing method should be adopted from the set of the interval throwing program. Throwing flat footed encourages improper body mechanics, placing increased stress on the throwing arm and, therefore, predisposing the arm to reinjury. The pitching coach and sports biomechanist may be valuable to the rehabilitation team with their knowledge of throwing mechanics.

Components of the Crow-Hop method are first a hop, then a skip, followed by the throw. The velocity of the throw is determined by the distance, whereas the ball should have only enough momentum to travel each designed distance. Again, emphasis should be placed upon proper throwing mechanics when the athlete begins phase two (throwing off the mound) or from his respective position, to decrease the chance of reinjury.

Throwing: Using the crow-hop method, you should begin warm-up throws at a

comfortable distance (approximately 30 to 45 ft) and then progress to the distance indicated for that phase (refer to Table 1). The object of each phase is for you to be able to throw the ball without pain the specified number of feet (45, 60, 90, 120, 150, and 180 ft), 75 times at each distance. After you can throw 180 ft 50 times without pain, you will be ready for throwing off the mound or to return to your respective position. (step 14). At this point, full strength and confidence should be restored in the athlete's arm. It is important to stress the crow-hop method and proper mechanics with each throw. Just as the advancement to this point has been gradual and progressive, the return to unrestricted throwing must follow the same principles. A pitcher should first throw only fast balls at 50% effort, progressing to 75% and 100%. At this time, you a game situation, again progressing at 50-75-100%. Once again, if you have increased pain, particularly in the joint, the throwing program should be backed off and re-advanced as tolerated, under the direction of the rehabilitation team.

Batting: Depending on the type of injury that you have, the time of return to batting should be determined by the physician. It should be noted that stress placed upon the arm and shoulder in the batting motion are very different from the throwing motion. Return to unrestricted use of the bat should also follow the same progression guidelines as seen in the training program. Begin with dry swings progressing to hitting off the tee, then soft toss and finally live pitching.

Summary: In using the interval training program in conjunction with a structured rehabilitation program, you should be able to return to full competition status, 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 procedures, proper pitching mechanics, and progressive throwing and batting will assist the player in returning safely to competition.

Summary Guidelines

1. Properly warm-up the entire body by jogging or performing simple calisthenics until light sweat.
2. Thoroughly stretch all muscle groups beginning with the legs and progressing through the pelvis, trunk, arms and ending with the shoulder (10 minutes).
3. Begin throwing under the guidance of a knowledgeable health care professional (physician, therapist, trainer, and/or coach). Perform each step for two consecutive 'e days, rest for one day, the progress to the next step.
4. **NEVER** progress to the next step if pain was encountered during the previous one.

5. Follow the progression rigidly. Do not skip your prescribed steps. If you increase the intensity too fast, you will increase your risk of re-injury and may delay your return to competition.
6. Perform your strengthening exercises of high repetitions (20-30 reps) and low resistance (5-10 lb) on the same day(s) that you throw *after* throwing unless otherwise instructed.
7. Stretch after performing the throwing and strengthening exercises.
8. Ice the rehabilitated area (front and back) for 15-20 minutes after exercising.
9. Use the off day for flexibility exercises and ice, if necessary.
10. Expect some soreness but not pain.

Phase I Interval Throwing Program

45' Phase	60' Phase	90' Phase	120' Phase
Step 1 Warm-up throwing 45' (25 throws) Rest 5-10 min. Warm-up throwing 45' (25 throws)	Step 3 Warm-up throwing 60' (25 throws) Rest 5-10 min. Warm-up throwing 60' (25 throws)	Step 5 Warm-up throwing 90' (25 throws) Rest 5-10 min. Warm-up throwing 90' (25 throws)	Step 7 Warm-up throwing 120' (25 throws) Rest 5-10 min. Warm-up throwing 120' (25 throws)
Step 2 Warm-up throwing 45' (25 throws) Rest 5-10 min. Warm-up throwing 45' (25 throws) Rest 5-10 min. Warm up throwing 45' (25 throws)	Step 4 Warm-up throwing 60' (25 throws) Rest 5-10 min. Warm-up throwing 60' (25 throws) Rest 5-10 min. Warm up throwing 60' (25 throws)	Step 6 Warm-up throwing 90' (25 throws) Rest 5-10 min. Warm-up throwing 90' (25 throws) Rest 5-10 min. Warm up throwing 90' (25 throws)	Step 8 Warm-up throwing 120' (25 throws) Rest 5-10 min. Warm-up throwing 120' (25 throws) Rest 5-10 min. Warm up throwing 120' (25 throws)
150' Phase Step 9 Warm-up throwing 150' (25 throws) Rest 5-10 min. Warm-up throwing 150' (25 throws) Step 10 Warm-up throwing 150' (25 throws) Rest 5-10 min. Warm-up throwing 150' (25 throws) Rest 5-10 min. Warm up throwing 150' (25 throws)	180' Phase Step 11 Warm-up throwing 180' (25 throws) Rest 5-10 min. Warm-up throwing 180' (25 throws) Step 12 Warm-up throwing 180' (25 throws) Rest 5-10 min. Warm-up throwing 180' (25 throws) Rest 5-10 min. Warm up throwing 180' (25 throws)		Step 13 Warm-up throwing 180' (25 throws) Rest 5-10 min. Warm-up throwing 180' (25 throws) Step 14 Begin throwing off mound or return to respective position Throwing program should be performed every other day, unless otherwise specified by your physician or rehabilitation specialist Perform each step 2 times before progressing to the next step
Flat Ground Throwing Warm-up throwing Throw 60' (10-15 throws) Throw 90' (10 throws) Throw 120' (10 throws) Throw 60' (flat ground) using pitching mechanics (20-30 throws)		Flat Throwing Warm-up throwing Throw 60' (10-15 throws) Throw 90' (10 throws) Throw 120' (10 throws) Throw 60' (flat ground) using pitching mechanics (20-30 throws) Throw 60-90' (10-15 throws) Throw 60' (flat ground) using pitching mechanics (20 throws)	

Stage one: Fastball only

Use Interval Throwing to 120' Phase as warm-up

- Step 1 Interval throwing to 120' phase as warm-up
15 throws off mound 50% Use speed gun to aid in effort control
- Step 2 Interval throwing
30 throws off mound 50%
- Step 3 Interval throwing
45 throws off mound 50%
- Step 4 Interval throwing
60 throws off mound 50%
- Step 5 Interval throwing
30 throws off mound 50%
- Step 6 30 throws off mound 75%
45 throws off mound 50%
- Step 7 45 throws off mound 75%
15 throws off mound 50%
- Step 8 60 throws off mound 75%

Stage two: Fastballs only

- Step 9 45 throws off mound 75%
15 throws in batting practice
- Step 10 45 throws off mound 75%
30 throws in batting practice
- Step 11 45 throws off mound 75%
45 throws in batting practice

Stage three

- Step 12 30 throws off mound 75% warm-up
15 throws off mound 50% breaking balls
45-60 throws in batting practice (fastball only)
- Step 13 30 throws off mound
30 breaking balls 75%
30 throws in batting practice
- Step 14 30 throws off mound 75%
60-90 throws in batting practice 25% breaking balls
- Step 15 Simulated game: progressing by 15 throws per workout