

Improve Pitching Performance: Why you need to put the ball down

By Mitch Dahl, Sport PT: ZONE Sports Physiotherapy, ZONE Performance Baseball
(Includes reference article by Eric Cressey, Cressey Sports Performance)

Although that title may sound counter-intuitive to many, the reality is that pitching year-round, or performing throwing programs year-round, will often put baseball athletes at a greater risk of injury and actually limit their potential performance.

The tremendous loads placed on an athlete while throwing or pitching a baseball have been well documented in the literature. Throwing a baseball is the fastest motion we perform as humans, with rotational speeds reaching up to 7000 degrees per second. The load on the front of the shoulder at full external rotation (ie. cocking, full lay-back) can reach one and half times body weight, while the distraction force on the arm can be one times body weight immediately following ball release – imagine trying to hold on to a 150-200 pound weight pulling on your arm. In many cases, the load capacity of the ulnar collateral ligament (ie. UCL, medial elbow) is reached on each pitch. Needless to say, we are dealing with tremendous load and speed. These forces result in tissue trauma and adaptive changes in baseball athletes that must be respected and addressed accordingly. As such, optimal individual throwing and pitching mechanics, and properly prepared and developed physical components are paramount to athlete health and performance.

At a professional, collegiate, academy or high school/club team level, this means taking at least 2 continuous months off from throwing and pitching to promote recovery of tissue health, and restoration of range of motion, stability and strength accordingly (see article that follows for specific considerations). *Put the ball down.*

At a youth sport level, the principles and guidelines of long term athlete development (LTAD) indicate that year-round single sport participation and competition (ie. early specialization) in baseball (or hockey, soccer, football, basketball, volleyball for that matter), is not optimal for the development of a physically literate athlete, and may also lead to higher injury risk and early athlete burnout. As such, young athletes should be encouraged to play multiple seasonal sports. Baseball season done? *Put the ball down.* Play hockey, soccer, football, basketball or various other sports.

The following article reference, ***Reasons Baseball Pitchers Shouldn't Do Year-Round Throwing Programs*** by Eric Cressey, is an excellent summary of several key considerations regarding why athletes at all levels need to put the ball down each year and focus on dedicated time to improve regional physical components and overall physical status, or another seasonal sport. Eric is widely recognized as an expert in the field of baseball athlete development, injury prevention, and performance. He brings together science and application, working with athletes at all levels, from youth sport to college and professional programs.

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"Reasons Baseball Pitchers Shouldn't Do Year-Round Throwing Programs"

When Thanksgiving rolls around, many of our professional baseball players at Cressey Sports Performance will start up their winter throwing programs after a full 10-12 week break from throwing. They're always a bit rusty in the first week of tossing after the layoff, but every single one of them always "figures it out" in a matter of a few weeks - and still has plenty of time to get in a solid throwing program prior to heading off to spring training. And, because they've been working hard in the gym on their strength, mobility, and soft tissue quality, they're always better off in the end. Still, there are those who insist that baseball pitchers don't need time off from throwing... *I couldn't disagree more.* I'm sure this will rub some folks the wrong way, but I can't say that I really care, as most of those individuals can't rationalize their perspectives outside of "guys need to work on stuff." I, on the other hand, have several reasons why baseball pitchers need time off from throwing.

1. They need to lose external rotation to gain anterior stability.

Having external rotation - or "lay back" - is important for throwing hard, and research has demonstrated that simply throwing will increase shoulder external rotation range-of-motion over the course of a season. This does not mean, however, that it's a good idea to just have someone stretch your shoulder into external rotation.

You see, when you externally rotate the humerus (ball) on the glenoid (socket), the humeral head has a tendency to also translate anteriorly (forward). In a well-functioning shoulder girdle, the rotator cuff musculature should prevent anterior instability, and it's assisted by adequate function of the scapular stabilizers, which offer the dynamic stability to reposition the scapula in the right place to "accommodate" the humeral head's positioning. For the athletic trainers and physical therapists out there, this is really what you're testing with an apprehension/relocation test.



The apprehension comes about because of either anterior instability or actual structural pathology (SLAP tear, rotator cuff impingement, or biceps tendinosis). The relocation component is just the clinician posteriorly directing the humeral head to create the stability that should otherwise be created by the rotator cuff and scapular stabilizers. *The take-home message is that while just going on year-round throwing programs in hopes of increasing external rotation seems like a good idea on paper, it's actually a terrible idea in the context of injury prevention. Pitchers should actually lose a few degrees of external rotation each off-season intentionally, as it affords them an opportunity to improve their stability.* This leads us to...

2. They need a chance to get their cuff strength and scapular stability up.

Baseball pitching is the single-fastest motion in all of sports, as the humerus internally rotates at velocities in excess of 7,000°/second. So, it should come as no surprise that at the end of a season, the strength of the rotator cuff and scapular stabilizers is significantly reduced. Having dealt with many of our players for up to five off-seasons now, I have a unique appreciation for how they each respond differently to not only the stress of the season, but also to arm care programs that we initiate at season's end.

It's important to remember that improving rotator cuff strength is no different in terms of adaptation than improving a bench press or squat. Adding 10% to someone's bench press might take three months in an intermediate population, or 12 months in a high-level lifter! Adaptation of the rotator cuff and scapular stabilizers is comparable. I need every minute of those three months without throwing to get guys back to at least baseline, and hopefully a bit above it.

Can you imagine if someone trying to improve their bench press went out and benched an additional 4-5 times a week on top of their regular strength and conditioning program?

Their progress would be minimal, at best, and they would be at a dramatically increased risk of injury. Throwing during a dedicated, appropriate structured early off-season arm care program is no different. Of course, if you throw year-round, then you can forget about getting these benefits, as the last thing you want is to be sore while you're "working on stuff" in the off-season. *That was sarcasm, in case you weren't picking up on it.*

3. They need to get their shoulder and elbow range of motion back.

As I noted earlier, throwing a baseball is the single-fastest motion in sports. With the crazy arm speeds one encounters, you have to keep in mind not only the muscles trying to accelerate the arm, but also the ones trying to slow it down. This "braking" challenge is called eccentric stress - and I'll talk more about it in a second.



What you need to know now, though, is that when left unchecked, significant eccentric stress can lead to tissue shortening. If you need further proof, **Reinold et al.** reported that immediately after a pitching outing, pitchers lose an average of 9.5° of shoulder internal rotation and 3.2° of elbow extension - and that these losses persisted at 24 hours post-throwing.

Now, imagine these acute range of motion losses being left unchecked for an entire season - or a season that simply never ends because pitchers are always throwing.

Fortunately, we can limit losses in range of motion during the season with appropriate mobility exercises, manual therapy, and breathing exercises - but the truth is that not everyone has access to these initiatives in terms of expertise, finances, or convenience. So, while we work to educate the masses on arm care, emphasizing time off from throwing programs is also a key component of an overall strategy to reduce injury risk.

One last thing on this topic: it is a nightmare to try to improve shoulder or elbow range of motion in a pitcher during a season, as the very nature of throwing works against everything you're trying to achieve. The off-season is "where it's at" in terms of optimizing range of motion in throwers.

4. They need to "dissipate" eccentric stress.

Okay, here's where I take #3 and geek out a bit. I apologize in advance.

Sometimes, you have to get away from the baseball world in order to learn about the baseball world. To that end, I need to thank Mike Reinold for bringing a great 2004 study from Tomiya et al to my attention.

These researchers created eccentric stress in muscle tissue of mice using an electrical stimulation model, and monitored blood markers of muscle damage for a period of time thereafter. What they found is that myofiber disruption really peaks at three-days post-exercise, then start to return down to baseline, yet they still aren't even there at *seven days* post-intervention.

Now, let's apply this to the world of pitching. Every single pitcher who throws more than once every 7-10 days is surely pitching with some degree of muscle damage. And, I can tell you that the two toughest challenges pitchers have reported to me are:

- a) moving from starting to relieving
- b) going from a 7-day high school or college rotation to a 5-day professional rotation

I firmly believe that pitchers need to throw in-season to stay strong, but I also know that we can't trump physiology. Sure, we need to have optimal nutrition and regeneration strategies in place, as we can't just baby guys and expect them to get better. However, make no mistake about it: high-level pitchers simply have to get good at pitching at 90% capacity (at best) if they are going to succeed.

If I already have a guy whose arm is working at a deficit for 8-9 months of throwing, the last thing I want to do is beat him up for the other three months with the same kind of volume and stress.



5. They need to allow any undetected low-grade injuries to heal.

As I discussed in an old article, most injuries (especially ulnar collateral ligament tears) come from the accumulation of chronic, low-level stress. Maybe you get some calcification on your ulnar collateral ligament or a low-level rotator cuff tendinosis, and it takes a few years and hundreds of innings before something finally "goes."

Old, low-level injuries are less likely to reach threshold if you give them some downtime and work on redistributing training stress. By strengthening the rest of your body in the off-season, you're dramatically reducing the demands on your rotator cuff with throwing.

You can't teach other joints to share the burden if the burden is never removed temporarily.

6. They need a chance to prioritize other competing demands.

Throwing is a good 20-30 minute endeavor each time you do it - and often even more. When I think about all the things that pitchers can be doing to get better in the off-season from a strength and conditioning standpoint, I have a really hard time justifying giving away that much time and recovery capability. There are other things that need to be prioritized at this time - and year-round throwing is an especially tough pill to swallow when you know that throwing is working against many of the very qualities - rotator cuff strength, scapular stability, mobility, and tissue quality - that you're trying to establish.

Closing Thoughts

The lack of downtime from throwing is especially problematic in younger populations, as they are skeletally immature and weaker. I'd argue that a really weak 15-year-old kid throwing 74-76 mph does far more damage to his body on each throw than a moderately strong professional player throwing 90-92 mph, especially given that the pro pitcher's mechanics are more optimized to protect the arm. This underscores the importance of "syncing up" mechanics, throwing programs, and the overall baseball strength and conditioning program.

Last, but certainly not least, remember that two weeks doesn't constitute "time off." Rather, I firmly believe that pitchers need the ball completely out of their hands for at least two month per year, preferably continuously. In other words, eight one-week breaks throughout the year is far from ideal, as it doesn't really allow for positive adaptations to occur.

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