

Developing Healthy Young Pitchers

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Are youth pitchers at risk for injury?



Andrews UCLR Experience

- 184 baseball pitchers (91 pro, 71 collegiate, 21 high school, and 1 recreational) between 1995 and 1999
- 624 baseball pitchers (196 pro, 302 collegiate, 124 high school, and 2 recreational) between 2000 and 2004.
- Professional = 2x, Collegiate pitchers = 4x High School pitchers = 6x more

» Fleising AJSM 2008



- "The No. 1 risk factor for UCL injuries is poor mechanics,"
- "The No. 2 factor is overuse. And if you overuse with poor mechanics, you're doomed."



Personal Experience

- 14 yo HS freshman, complete tear of UCL on 138th pitch of the game
- 12 yo pitching for 2 youth teams = growth plate injury = out for 6 months
- 12 yo – best pitcher for 2 years, now can't pitch
- Area LL player teaches self to pitch left handed in 6th grade because of right elbow injury



- Five percent of youth pitchers suffer a serious elbow or shoulder injury (requiring surgery or retirement from baseball) within 10 years

– Fleisig, Sports Health, 2012

- 5.7 million youth (<8th)
- Preventable



Risk Factors

- Pitches per game (80)
 - 3.83
- Innings per c year (100)
 - 3.5
- Months per year (8)
 - 5.05
- Catcher
 - 2.7
- Pitching while fatigued
 - 36.18
- Concurrent teams
- Hard throwers
- Poor biomechanics

– Fleisig, Sports Health 2012



LLB and ASMI Pitch Counts

AGE	MAX PITCHES PER GAME
8-10	75
11-12	85
13-16	95
17-18	105



Rest Rules

# Pitches	Age 16 and under
61+	3 days
41-60	2 days
21-40	1 day
1-20	0 days

# Pitches	Age 17-18
76+	3 days
51-75	2 days
26-50	1 day
1-25	0 days

– Still important to recognize fatigue



USA Baseball Pitch Types

PITCH TYPE	AGE
Fastball	8
Change-Up	10
Curveball	14
Knuckleball	15
Slider	16
Forkball	16
Splitter	16
Screwball	17



Coaching Conundrum:

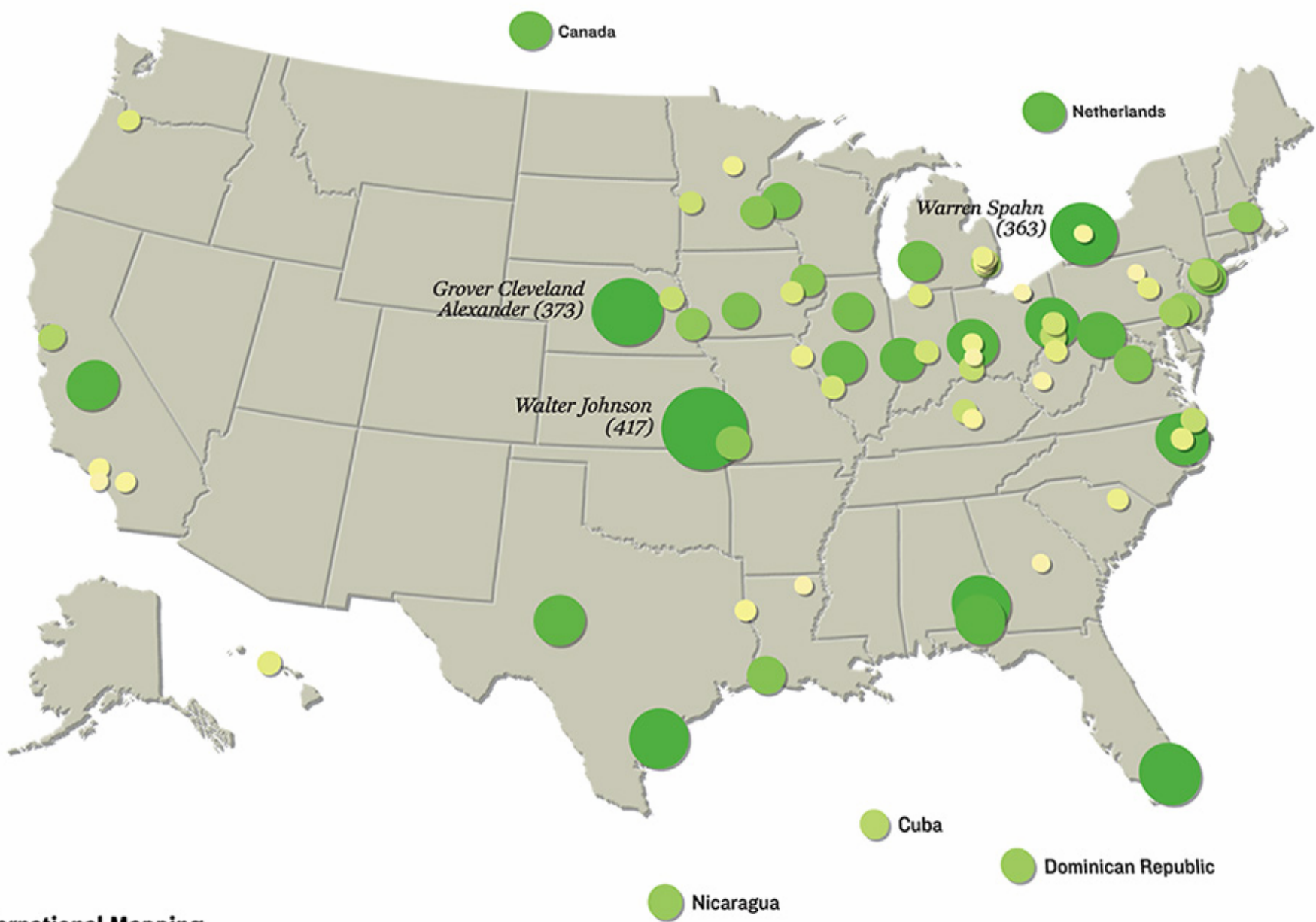
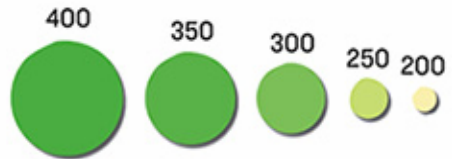
- “10,000 repetitions to perfect a motor skill”
- “Shot 500 jumpers a day in the summer”
- “Practice makes perfect”



Is this true for pitchers?

- Performance = optimal health balanced with optimal training
- Are you sacrificing future performance for current participation?





4 Important Steps in Developing Youth Pitchers

- Fundamental Mechanical Development (task approach)
- Dynamic Warm Up - Coordination and Body Control
- Throwing progression
- Strengthening



Proper Mechanics

Mechanical Risk Factor Identification

(Werner, 07)

Magnitude of shoulder distraction is increased by

- Longer time interval between stride foot contact and max ER
- Decreased ER at SFC
- Earlier fwd movement of the head relative to the hips
- Less elbow flexion at time of peak valgus torque
- Increased elbow flexion at MER
- Increased Max Horizontal Add
- Decreased elbow flexion at release
- Decreased elbow valgus torque
- Decreased Sh ABd torque



The Effect of Pitching Biomechanics on the Upper Extremity in Youth and Adolescent Baseball Pitchers

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- Evaluated 5 parameters
- 169 pitchers, 13.4 yrs (9-18)(Y=9-14, A=14-18)
- 80.7% of the adolescent pitchers performed 3 or more parameters correctly, compared with only 64.0% in the youth group



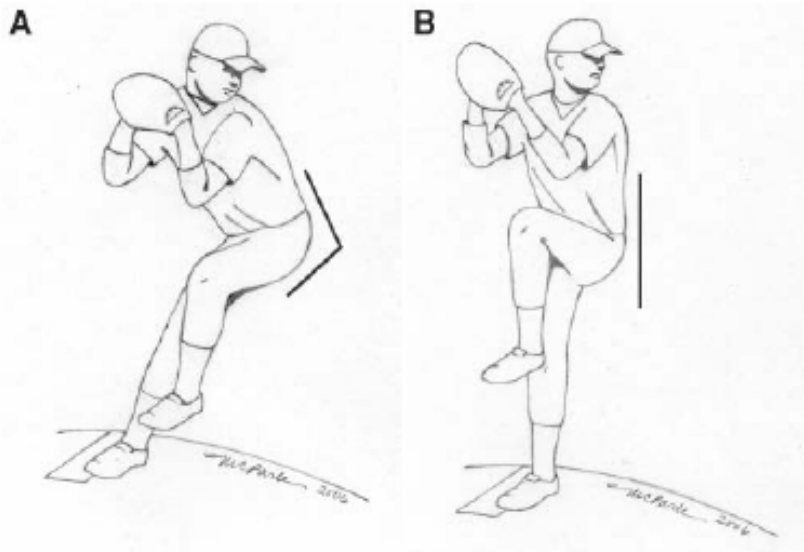


Figure 1. A, leading toward home plate with the hips—defined as the pelvis leading the trunk toward home plate during the early cocking phase; B, any pitcher who remained vertical in the early cocking phase did not lead with the pelvis. The authors thank Maxwell C. Park, MD, for the illustrations.

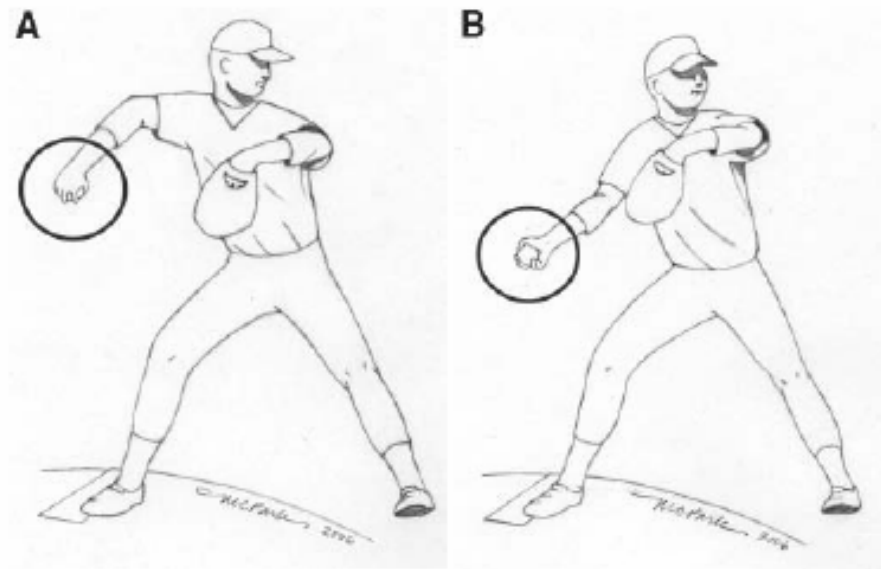


Figure 2. A, hand-on-top position—defined as the throwing hand being on top of the ball (forearm in pronation) as it comes out of the glove during early cocking; B, hand under the ball (forearm in supination). The authors thank Maxwell C. Park, MD, for the illustrations.



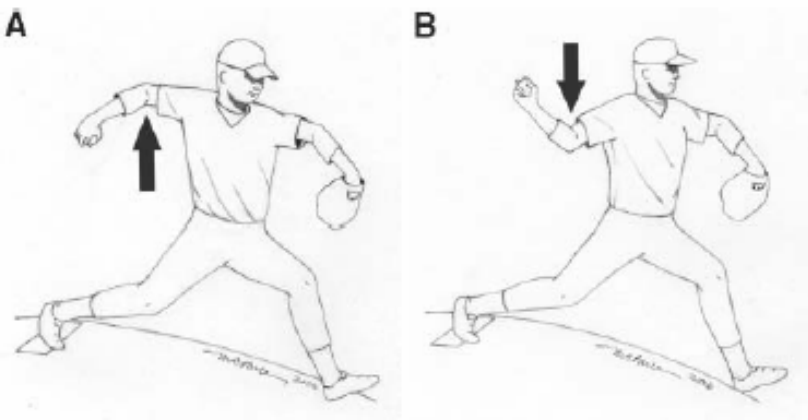


Figure 3. A, arm in throwing position—defined as the elbow reaching its maximum height (glenohumeral abduction) by stride foot contact; B, any pitcher whose elbow was not at its highest point by stride foot contact did not have the arm in throwing position. The authors thank Maxwell C. Park, MD, for the illustrations.

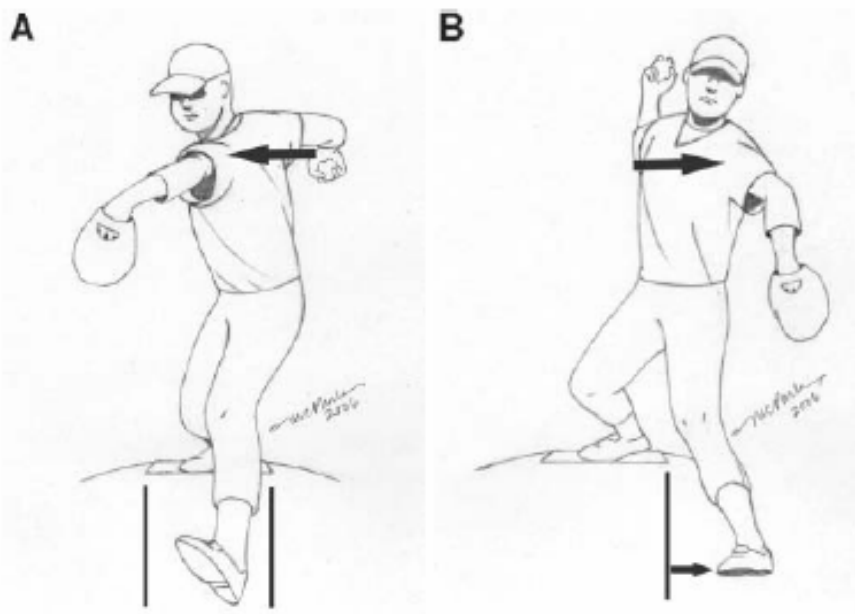


Figure 4. *Parameter 4:* A, closed-shoulder position—defined as the lead shoulder being in a closed position and pointing toward home plate at stride foot contact; B, open position. *Parameter 5:* A, stride foot toward home plate—defined as the stride foot being pointed toward home plate at stride foot contact; B, foot not pointed toward home plate. The authors thank Maxwell C. Park, MD, for the illustrations.



INVERTED “W”



- Youth w/ only 1 or 2 parameters correct had higher nHIRT (shoulder stress) and nEVL (elbow stress) and lower nHIRT/velocity (efficiency) when compared with those who performed 3 correctly.
- Same w/ 3 vs 4 correct
- Not true for Adolescent group



- **Hand-on-top position and closed-shoulder position**
 - (youth and adolescent) = more efficient (lower nHIRT/velocity and nEVL/velocity) than those who performed both parameters incorrectly (P = .035 and .042, respectively)



Mechanical Enhancement Drills

- External Feedback
- Practice without increasing pitching volume
- Can be a good biofeedback method
- Controversial among pitching coaches



MEDs

(Mechanical Enhancement Drills)



Dynamic Warm Up - Coordination and Body Control

- Many mechanical faults are related to coordination and timing
- DMU > SS for injury prevention and for performance



PEDs (Performance Enhancing Drills)

CyberLink PowerDirector Trial Version



Throwing Progression

- Wrist Flicks
- Wrist-Elbow Flicks
- Trunk Rotation Throws
- Gorilla Throws
- Closed Step Progressive Long Toss
 - *Avoid grenade throwing*



Strength

- Hip weakness correlated with shoulder injuries
 - (Burkhart et al) found 44% throwers with SLAP lesions presented with significant hip weakness
- They included a .89 correlation between throwing velocity and lower body strength.
 - » 2001 Matsuo et al



Ideas for Practice

- Forward and Lateral Lunges
- Squats and Jumps
- Fence Tubing for Rotator Cuff
- Birds and Hummingbirds
- Spidermans and Inchworms

Use the hill, use non-field time, water or bands



Questions, Other Suggestions, Testimonials



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