

Optimizing Arm Health: Youth Baseball

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Background



- **Education**

- Burnsville High School
- DMACC/Concordia St. Paul (BS)
- St. Catherine University (PT)

- **Professional**

- Pitch 2 Pitch
- Minnesota Twins
- Twin Cities Orthopedics (Current)
- Shed Athletics (Current)

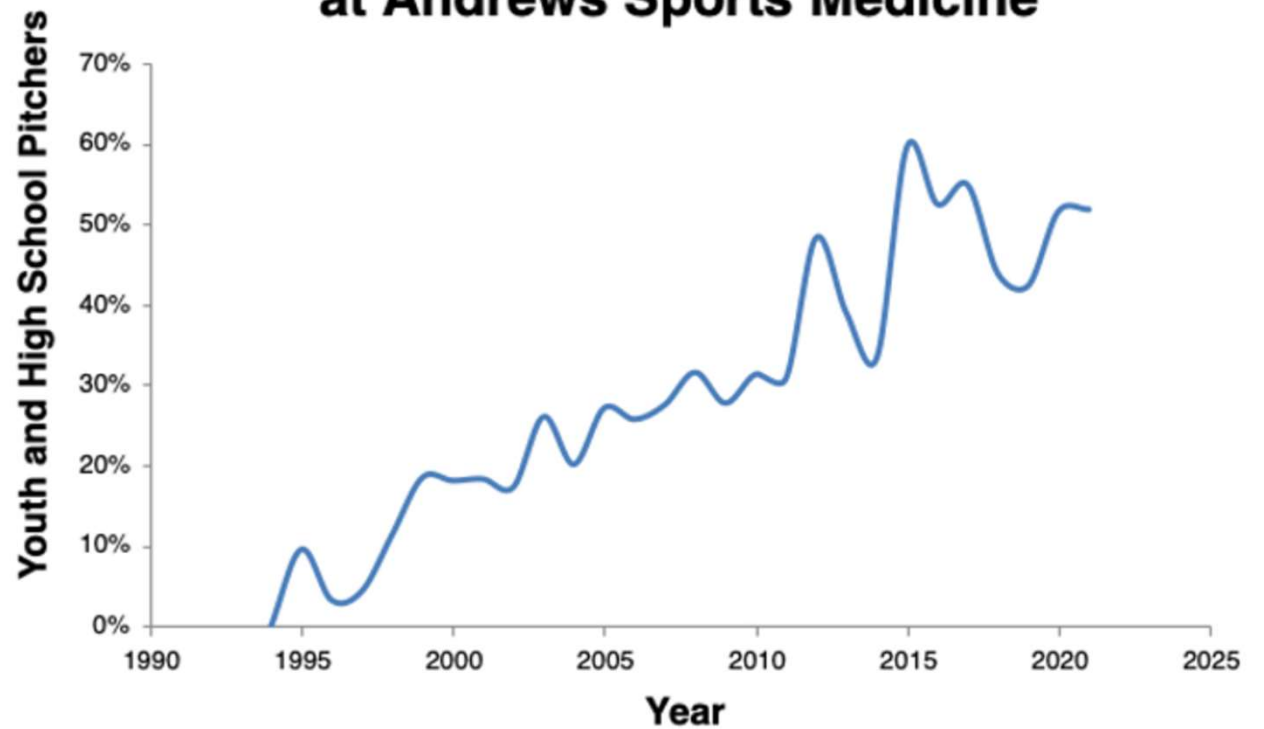


INJURY
TRIVIA



**Is Tommy
John a
Professional
Problem?**

UCL Surgeries for Baseball Pitchers at Andrews Sports Medicine



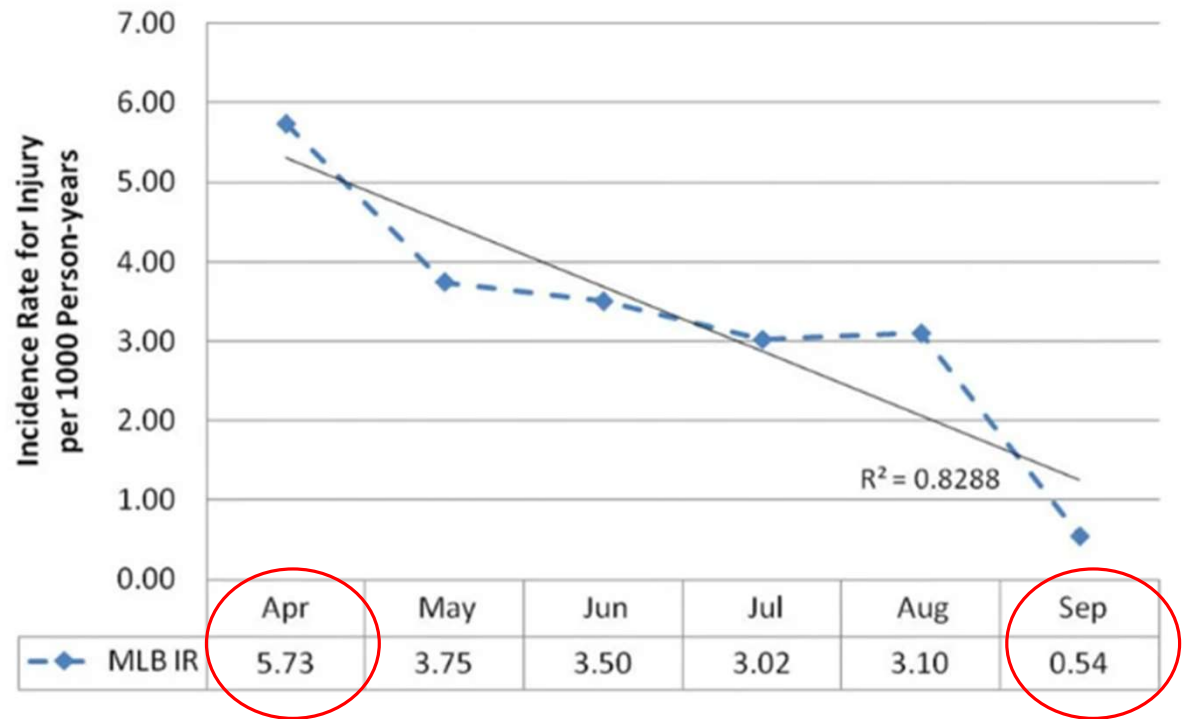
What is the biggest risk factor for injury?

- A. Fatigue
- B. Throwing Velocity
- C. Pitch Type/Usage
- D. Throwing Mechanics

A) Fatigue

Throwing with fatigue increases
risk for injury by 36x!!

When Do Most Injuries Occur?



**Baseball is experiencing
an injury epidemic at
ALL levels**

What's the problem?

Throwing
Velocity

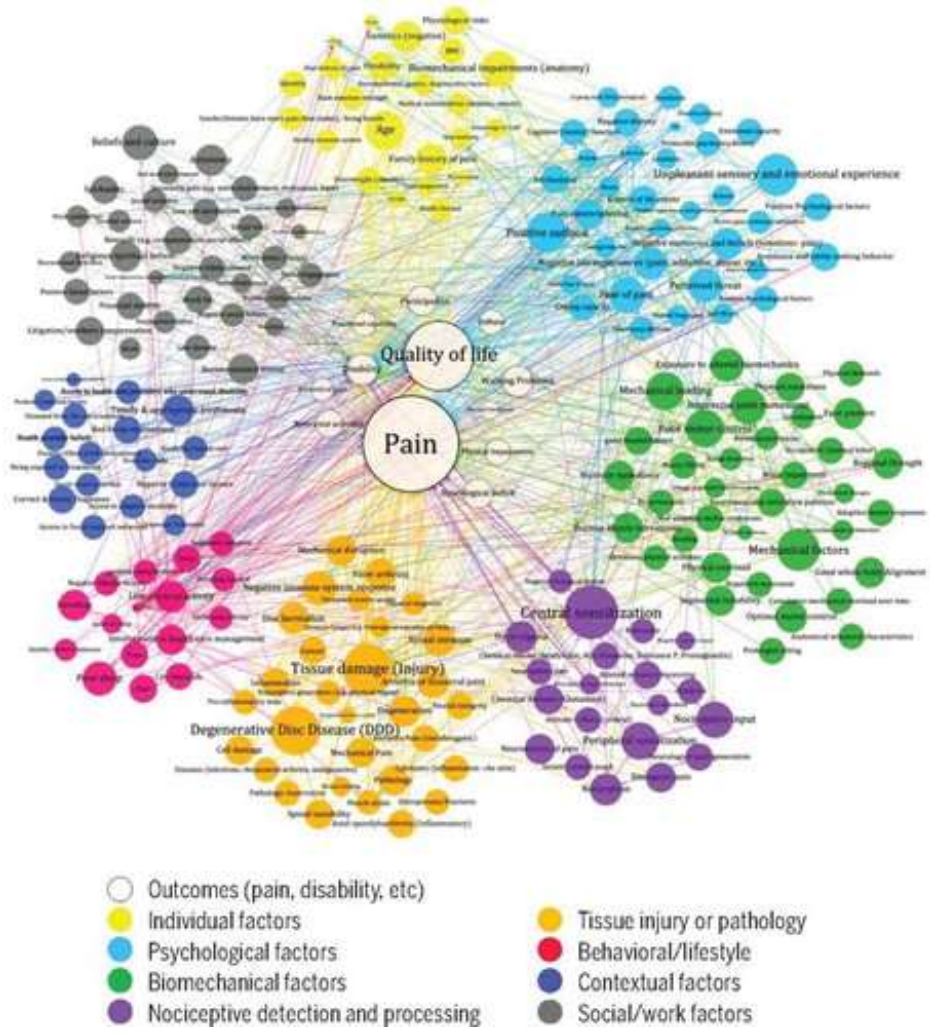
Weighted
Baseballs

Pitch Type

Overuse

Throwing
Mechanics

Reality of Pain and Injury



Injury Equation



Simplified Injury Equation



How to address the injury epidemic

**Proper
preparation**

**Consistent
monitoring**

**Early
Action**

What is arm care?

- Arm care is a holistic approach to prepare the arm for the demands of throwing
 - Including:
 - Warm-up
 - Throwing Program
 - Strength Training
 - Specific arm care exercises
 - Off Field Recovery (sleep, diet)

Arm Care is **NOT** a recipe of exercises guaranteed to prevent injury

Big 3 Mistakes

Mismanagement
of throwing
workload

Lack of strength
and/or mobility

Ignores early
signs of pain

Workload & Fitness

Throwing Workload

Refers the total amount of throwing (“work”) performed while accounting for volume, intensity, and frequency

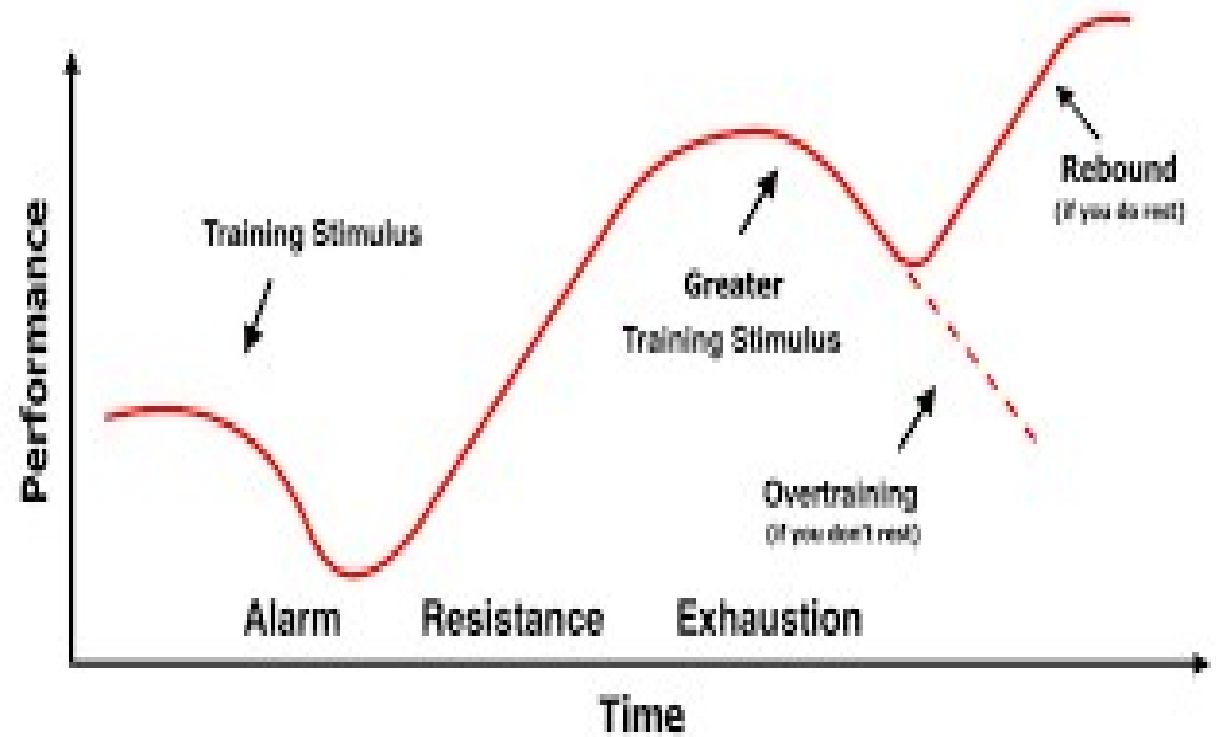
- Ex: what is more stressful?
 - 50 throws @60% intensity
 - 25 Throws @ 100% intensity

Throwing Fitness

Refers to the workload of throwing you are prepared for relative to the throwing performed over the short and long term

- Ex: Marathon running

General Adaptation Syndrome



Throwing Workload Mistakes

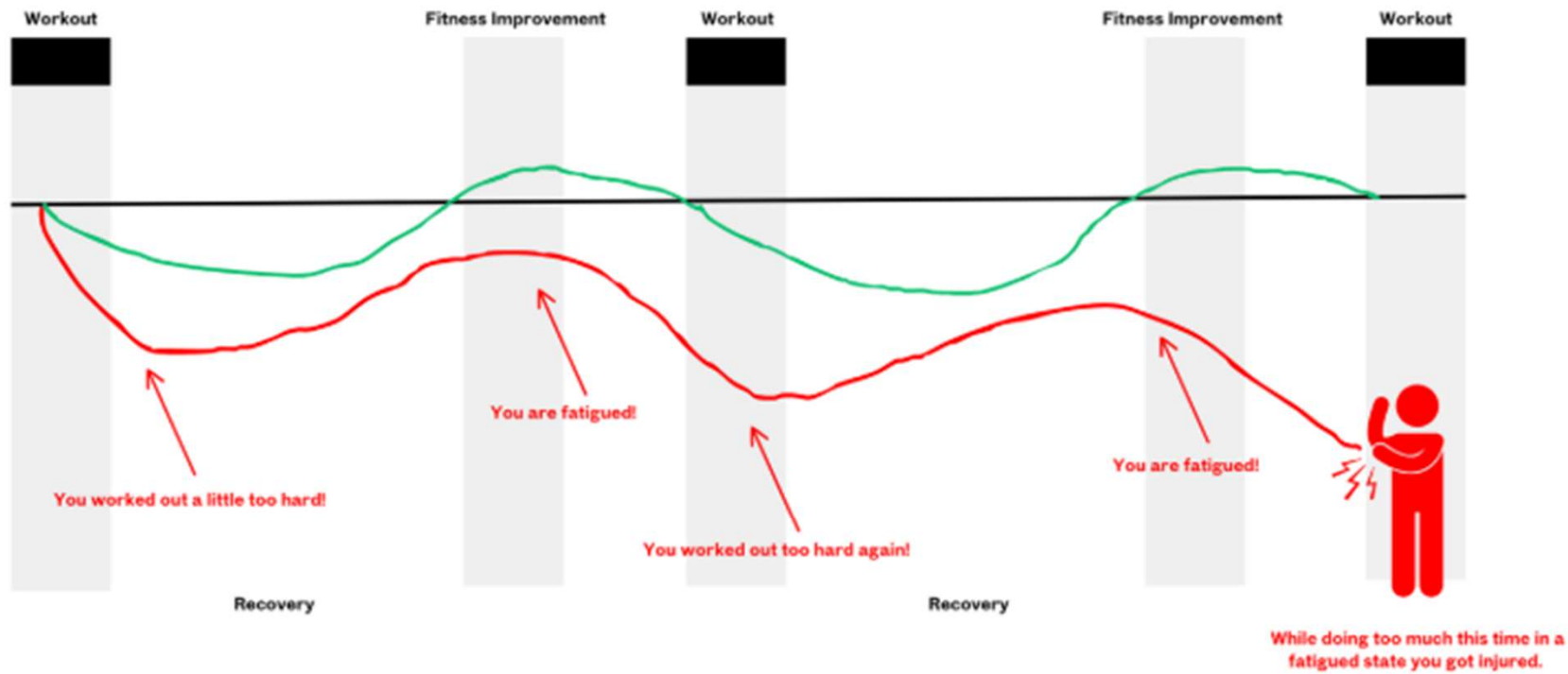
#1: “All Gas No Brakes”

- Throws too much
- Always throws at high effort
- Chases velocity all offseason
- Velo program + clinics + lessons
- Thinks arm pain is normal

#2: “Save the bullets”

- Makes as few throws as possible
- Never throws high effort outside of games
- Throws 1-2x/week in the offseason
- Takes time off in presence of any soreness

OVERTRAINING EXAMPLE



Undertraining Example



Preparation

Demands

Throws 1-2x/week

20 pitch bullpen

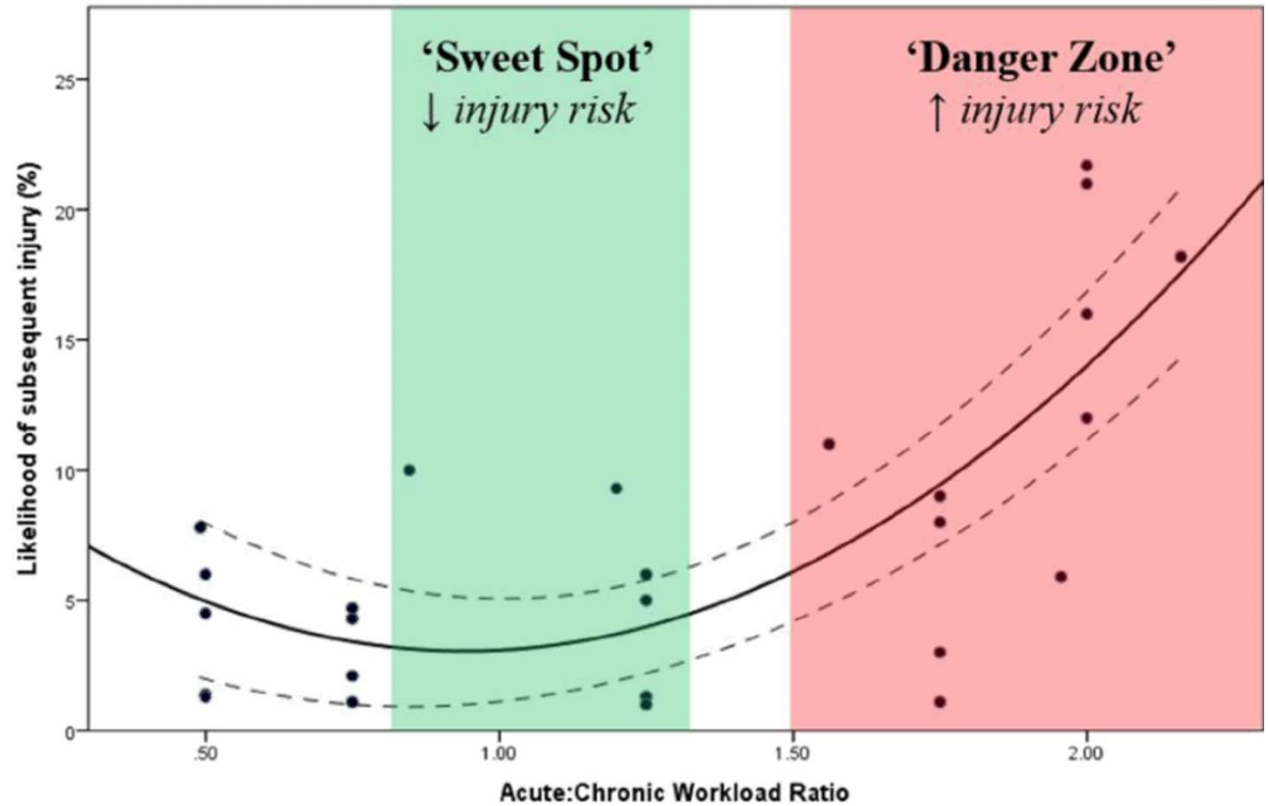
Practice 2-3x/week

3-5+ games per week

50-75 pitches per game



THE “SWEET” SPOT



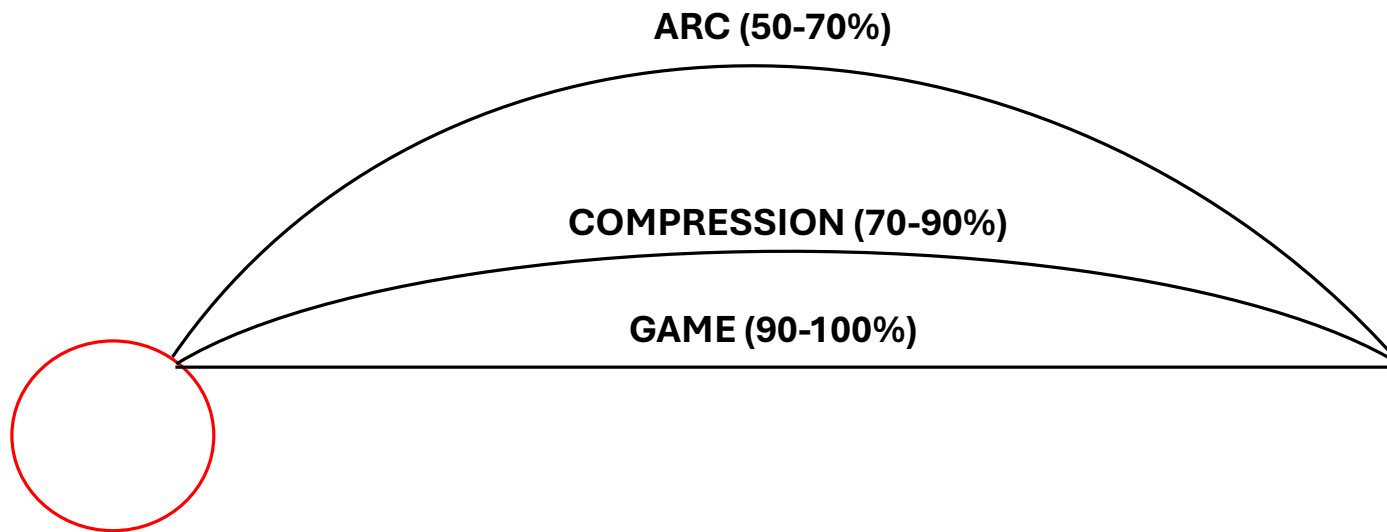
Throwing to Prepare for Season

- Youth Athletes should throw a **MINIMUM** of 3x/week for 6 weeks leading up to the start of the season
 - Ideally 8-12 weeks
- Gradual Progression of Volume AND Intensity
 - Increase EITHER volume OR intensity each week
 - 30% rule – do no more or less than 30% of what you did the week before
 - Include low and high effort throwing days in a week

Defining Throwing Intensity

Intensity Zone	RPE OR % Velocity	9-11U	12-13U	14-15U	Type of Throw
Zone 1	50-60%	0-30ft	30-45ft	45-60ft	Arc
Zone 2	60-70%	30-45ft	45-60ft	60-75ft	Arc
Zone 3	70-80%	45-60ft	60-75ft	75-90ft	Compression
Zone 4	80-90%	60-75ft	75-90ft	90-105ft	Compression
Zone 5	90-100% OR Position specific	75-90ft OR Position specific	90-105ft OR Position specific	105-120ft OR Position specific	“Game”

Type of Throwing



Sample Throwing Build Up (Wk 1-3)

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
WK 1	x30 @ Z1	x30 @ Z2	OFF	x30 @ Z1	x30 @ Z2	OFF	OFF

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
WK 2	x30 @ Z1	x45 @ Z2	OFF	x30 @ Z1	x45 @ Z2	OFF	OFF

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
WK 3	x30 @ Z1	x30 @ Z2 x15 @ Z3	OFF	x30 @ Z1	x30 @ Z2 x15 @ Z3	OFF	OFF

Sample Throwing Build Up (Wk 4-6)

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
WK 4	x30 @ Z1	x30 @ Z2 x30 @ Z3	OFF	x30 @ Z1	x30 @ Z2 x30 @ Z3	OFF	OFF

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
WK 5	x30 @ Z1	x45 @ Z2-3 x15 @ Z4	OFF	x30 @ Z1	x45 @ Z2-3 x15 @ Z4	OFF	OFF

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
WK 6	x40 @ Z1-2	x40 @ Z2-3 x20 @ Z4	OFF	x40 @ Z1	x40 @ Z2-3 x20 @ Z4	OFF	OFF

Sample Throwing Build Up (Wk 7-9)

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
WK 7	x40 @ Z1-2	x40 @ Z2-3 x20 @ Z4	OFF	x40 @ Z1	x30 @ Z2-3 x10 @ Z4 x10 @ Z5	OFF	OFF

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
WK 8	x40 @ Z1-2	x30 @ Z2-3 x10 @ Z4 x10 @ Z5	OFF	x40 @ Z1	x30 @ Z2-3 x15 @ Z4 x15 @ Z5	OFF	OFF

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
WK 9	x40 @ Z1-2	x30 @ Z2-3 x15 @ Z4 x15 @ Z5	OFF	x40 @ Z1	x30 @ Z2-3 x10 @ Z4 x20 @ Z5	OFF	OFF

Sample Throwing Build Up (Wk 10-12)

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
WK 10	x50 @ Z1-2	x30 @ Z2-3 x10 @ Z4 x20 @ Z5	OFF	x50 @ Z1-2	x30 @ Z2-3 x10 @ Z4 x20 @ Z5	OFF	OFF

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
WK 11	x50 @ Z1-2	x30 @ Z2-3 x10 @ Z4 x20 @ Z5	OFF	x50 @ Z1-2	x30 @ Z2-3 x10 @ Z4 x25 @ Z5	OFF	OFF

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
WK 12	x50 @ Z1-2	x30 @ Z2-3 x10 @ Z4 x25 @ Z5	OFF	x50 @ Z1-2	x30 @ Z2-3 x10 @ Z4 x25 @ Z5	OFF	OFF

Throwing Buildup Overview

Week	Total Throws	“Game” Throws	Max Intensity
1	120	0	Z2
2	150	0	Z2
3	150	0	Z3
4	180	0	Z3
5	180	0	Z4
6	200	0	Z4
7	190	10	Z5
8	190	25	Z5
9	200	35	Z5
10	220	40	Z5
11	225	45	Z5
12	230	50	Z5

2. Lack of Strength or Mobility

- Throwing is the most **stressful** technical skill in **ALL** of sports
- Compensations will allow athletes to perform task in spite of lacking strength or mobility
 - This can lead to stress being applied to unwanted structures and eventually injury

Strength & Mobility Demands of Shoulder

- 150-180 deg of layback
- Accelerates at 6500 deg/sec into ball release
- Distraction forces greater than 1x bodyweight

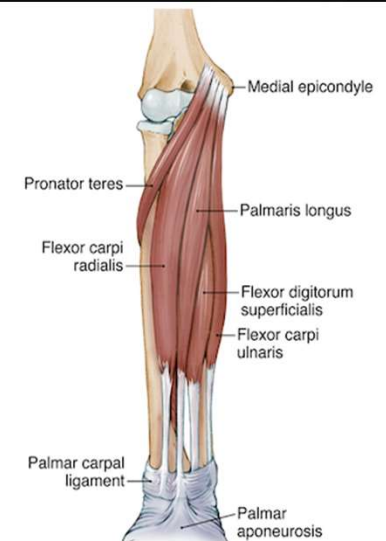


Strength & Mobility Demands of Elbow

- Elbow experiences **50-100Nm** of valgus stress
- UCL can withstand **30-40Nm** before rupture

Why doesn't the UCL tear with every pitch?

Dynamic stabilization of forearm musculature



Preparation

Demands

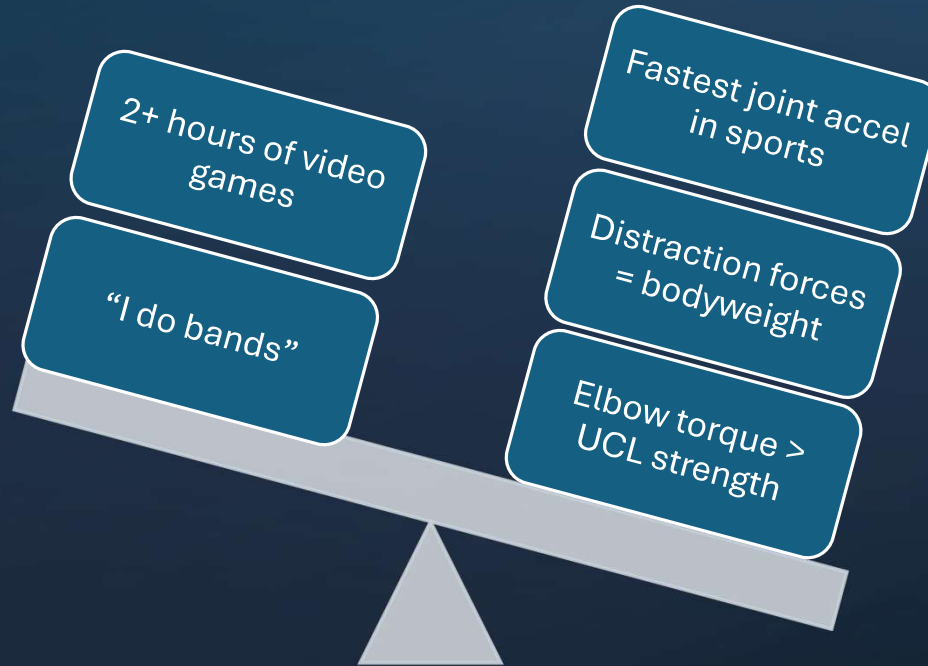
2+ hours of video games

"I do bands"

Fastest joint accel
in sports

Distraction forces
= bodyweight

Elbow torque >
UCL strength



Offseason Strength and Mobility Routine

#1 Recommendation to all athletes is participate in a structured and supervised strength and conditioning program

Areas to address:

- Mobility of shoulder and thoracic spine
- Global strength of full body
- Local strength of rotator cuff and scapular stabilizers
- Local strength of forearm flexors and grip strength

3. Ignoring Early Signs of Pain

- Pain is an ALARM signal
 - Typically presents first as a WARNING
 - Soreness, discomfort, decreased performance
- Break down or injury occurs if ignored for too long
- Athletes are competitive and fear shutdown if they communicate

Early vs. Late Identification

Late identification of pain → reactive response

- Shutdown period of throwing
- Potential surgery if structural damage
- Long term Rehab stint
- Throwing build up period

Early identification of pain → proactive response

- Modification of throwing
- Short term rehab stint
- Continue to play
- Minimal build period required

Pain vs. Soreness

Pain

- Located in joint (front of shoulder, inside of elbow etc.)
- Present during throwing
- Lasts longer than 48 hours
- Associated with “pop”

Soreness

- Located in muscular region
- Onset AFTER throwing
- Subsides within 48 hours
- Improves with warm-up

Identifying Pain Early

01

COMMUNICATE

02

EDUCATE

03

MONITOR

What to do in presence of injury?

Dr. Hess

- Pain lasting >2 weeks
- Pain with activities other than throwing
- Onset of pain accompanied with “pop”
- Unable to tolerate throwing at any intensity

PT with Scott

- Pain onset <2 weeks prior
- Pain only with throwing and mild in intensity
- Pain only present with high effort throwing
- No sudden onset of pain

Additional Considerations

PERFORMANCE NUTRITION | FUELING FOUNDATIONS

WHY IS FUELING IMPORTANT?

PERFORMANCE

- Maintain energy levels
- Increase strength, power, speed
- Prevent and recover from injury
- Improve body composition
- Immune system function



HEALTH

- Proper growth and development
- Hormone communication and balance
 - Muscle + brain connection
- Improve brain health, focus, and mental clarity
- Decrease risk of chronic disease
- KEEPS US DOING WHAT WE LOVE

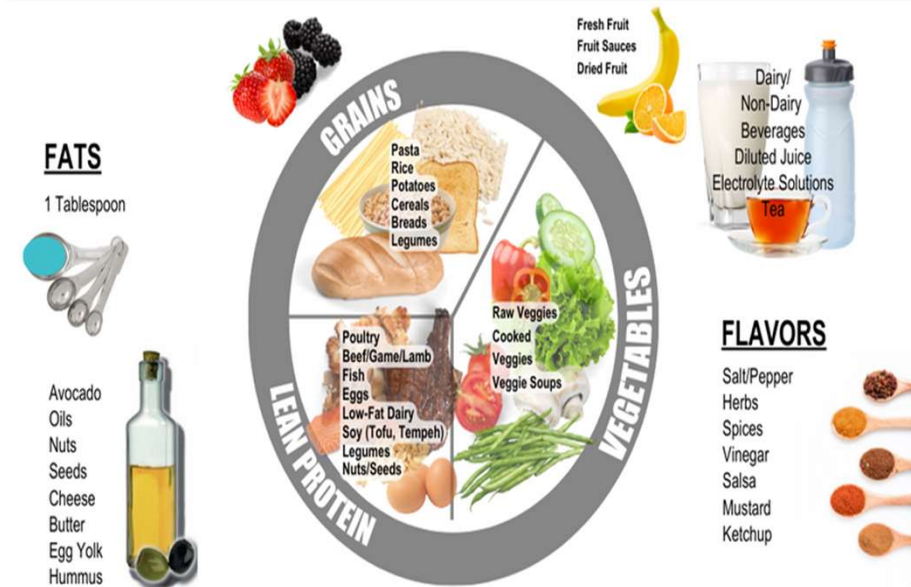


“Nutrition can make an average athlete great, or a great athlete average”

-Academy of Nutrition & Dietetics

PERFORMANCE NUTRITION | FUELING FOUNDATIONS

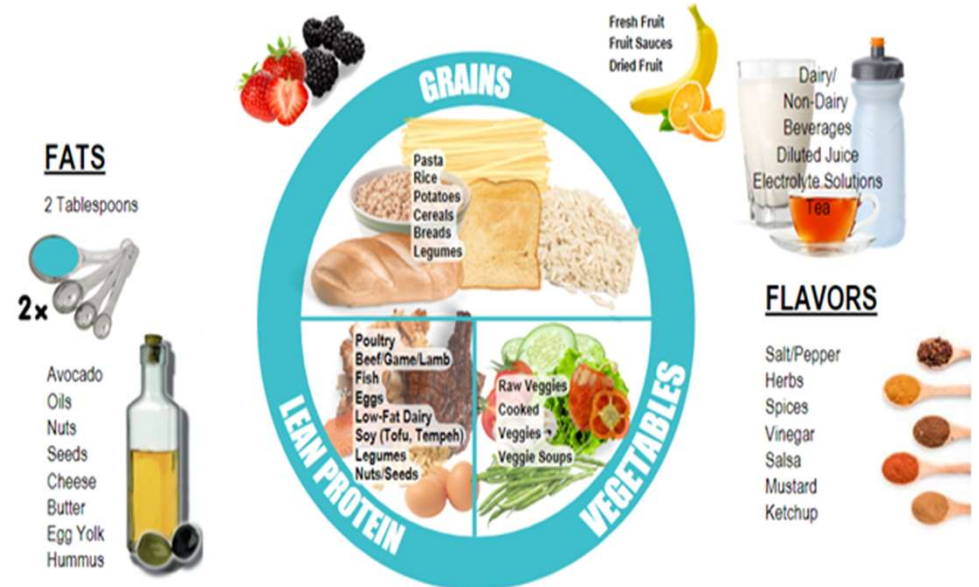
MODERATE TRAINING LOAD



Adapted from the United States Olympic Committee's Athlete's Plate



HIGH TRAINING LOAD



Adapted from the United States Olympic Committee's Athlete's Plate



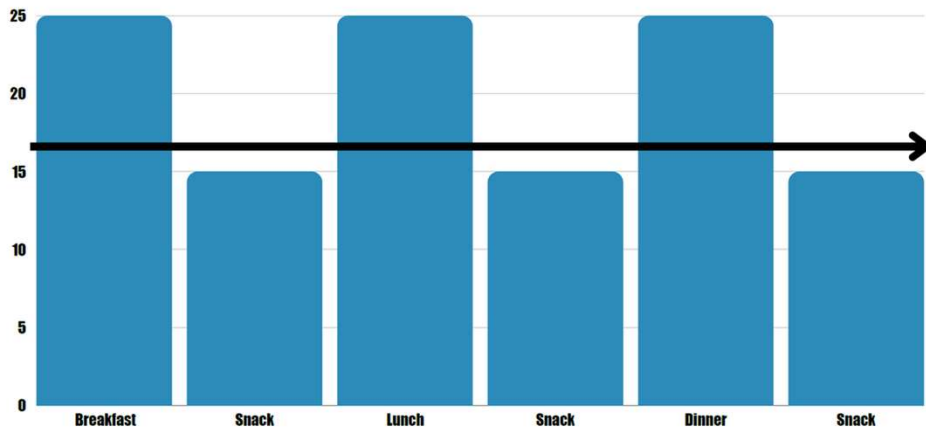
Questions? Angela Tullbane, RDN, LD | AngelaTullbane@TCOmn.com

PERFORMANCE NUTRITION | NUTRIENT TIMING

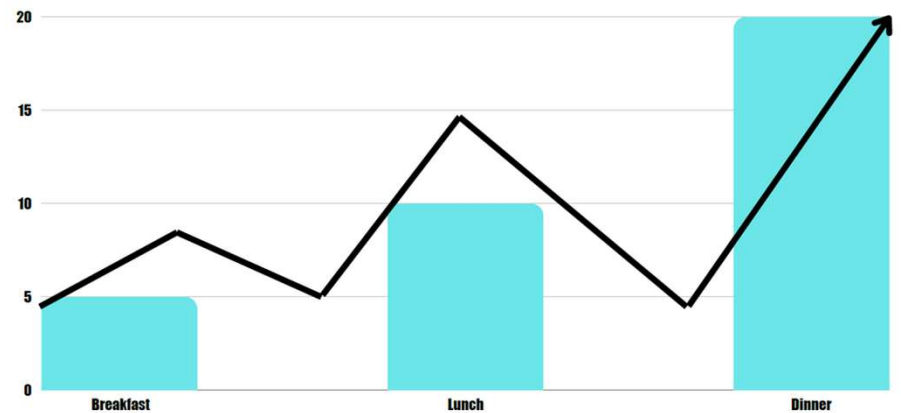
SAMPLE DAY - SCHOOL

7:00 AM---Wake up

Stable Energy Levels



Unstable Energy Levels



2 fists of rice + 2 palms of lean steak + side

salad + milk

9:30 PM ---BEDTIME SNACK

Turkey, cheese, tortilla roll-up

10:00 PM---SLEEP

Questions? Angela Tullbane, RDN, LD | AngelaTullbane@TCOmn.com

Conclusion

Arm care is more than just a few baseball specific exercises

Preparing the arm is the first step in caring for the arm

Identifying signs of pain early is crucial in minimizing severity of injury

Handouts

Pre-Throwing Band
Routine

Baseball Focused Mobility
Routine

Baseball Focused Strength
Program (off-season)

Questions?

Contact + Resources

Scott Richardson, DPT, PT, CSCS
Twin Cities Orthopedics – Plymouth
scottrichardson@tcomn.com

Resources

- PWYBA Arm Care Program
- Sports Nutrition – Angela Tullbane, RDN
 - Angelatullbane@tcomn.com
- Sports Performance