



Keeping Kids in the Game for Life

Preventing Sports Injuries in Children

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The incidence of sports injuries in children is increasing.

↑ Acute Injuries & ↑ Overuse Injuries

These injuries can have lifelong implications.



95% are “soft tissue” injuries due to minor trauma

- R.I.C.E.

Bruises	Cuts
Strains	Abrasions
Sprains	

Remainder include concussions and fractures – more commonly in competition



30 million children, nearly $\frac{3}{4}$ of U.S. households with school-age children have at least one child that plays organized sports

(Source: Safe Kids USA)

Participation in high school athletics is increasing, with more than 7.3 mil HS students participating annually

(Source: National Federation of State High School Associations)

HS athletics account for more than 2 million injuries annually, including:

- 500,000 doctor visits
- 30,000 hospitalizations

(Source: Centers for Disease Control)

Each year, more than 3.5 mil children under the age of 14 receive medical treatment for sports injuries

Children 5-14 account for nearly 40% of **all** sports-related injuries treated in hospital ED's

- More than 775,000 children

The rate and severity of sports-related injuries increases with a child's age

(Source: Safe Kids USA)

Most organized sports-related injuries (62%) occur during **practice**

- 33% parent often do not take the same safety precautions during practice

Collision and contact sports are associated with higher rates of injury

- Individual sports, ie. skating, biking, tend to be more severe

Although death is rare, TBI is leading cause

- Bicycling, skateboarding and skating

(Source: Safe Kids USA)

The Facts - Acute

Before puberty, girls and boys suffer the same risk of sports injuries.

During puberty, boys suffer more injuries more severely than girls.

Children and adolescents who are just beginning a sport or activity are at greater risk for injury.

(Source: Safe Kids USA)

Injury by Sport*

•Basketball	200,000
•Baseball and Softball	143,000, 3-4 deaths/yr
•Bicycling	320,000, 225 deaths/yr
•Football	159,000
•Gymnastics	25,500
•Ice Hockey	18,000
•Ice Skating	10,600
•In-Line Skating	38,000
•Skateboarding	27,500
•Sledding	8,500
•Skiing/Boarding	29,000/9,000
•Soccer	77,500
•Trampolines	80,000



*ED visits in children 5-14

Football	28%
Baseball [†]	25%
Soccer	22%
Basketball	15%
Softball [†]	12%

[†]Five-fold increase in the number of serious shoulder and elbow injuries since 2000

*ED visits in children 5-14

THE PATHOLOGY OF PITCHING

Researchers at the American Sports Medicine Institute broke down the fastball pitches of healthy, elite pitchers frame-by-frame to study the effect of pitching on the human arm. Their conclusion: Unless it's done very carefully, a major league fastball will eventually spell major league arm trouble.

Critical instant Arm acceleration

As the pitcher "cocks" his arm to throw, his arm is rotating into a position for which it wasn't designed.



Centrifugal force is literally trying to pull the pitcher's arm out of its socket. The pitcher's muscles respond by pulling back with all their strength.

The total pulling force can add up to as much as 125% of the pitcher's body weight, or 200 pounds or more of pull on the arm.

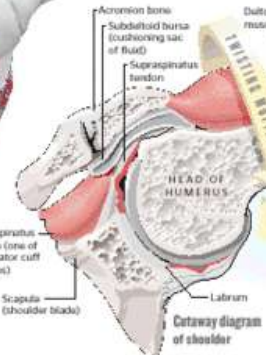
Critical instant Arm deceleration

The outer ligaments of the elbow absorb much of the energy as the arm decelerates from the throwing motion. The shoulder takes punishment here too, as the head of the humerus — the "ball" in the shoulder's ball-and-socket joint — slams forward and twists.



Both the elbow and the shoulder twist backward about as far as they can go, and the momentum tries to push them even farther.

The inside ligament of the elbow and the tendons and cartilage of the shoulder bear the brunt of the pitcher's effort as he begins to whip his arm forward.



The sharp twisting of the humerus combined with the pushing and pulling of the arm and shoulder muscles can grind the bone surfaces and stretch the tendons of the shoulder.

Ways to minimize the damage include:
Improving overall muscle tone;

Using proper pitching mechanics that reduce the stress on the most vulnerable parts of the joints;

Limiting the number of pitches thrown per game.

The six stages of the pitching motion

The windup

Stress to the body is minimal as the pitcher coils his body, developing potential energy to propel the ball.



LOW STRESS

The stride

As the legs spread wide, placement and rotation of the feet is critical; too "open" a stance can put undue stress on the arm.



Joint under stress

STRESSES BUILDING

Arm cocking

The arm assumes a 90-degree angle from the trunk; the elbow cocks to about 90 degrees as the trunk begins to rotate forward and the shoulder begins to rotate backward.



Foot contact

MAXIMUM STRESS

Arm acceleration

Huge torque forces build up on first the elbow, and then the shoulder as the pitcher whips his arm forward to fire the ball toward the plate.



Arm deceleration

Stretching, compression and torque hammer the shoulder and the outer ligament of the elbow as the whipping arm reaches the end of its forward motion.



Follow-through

The trunk moves forward and down to help dissipate the tremendous throwing energy.

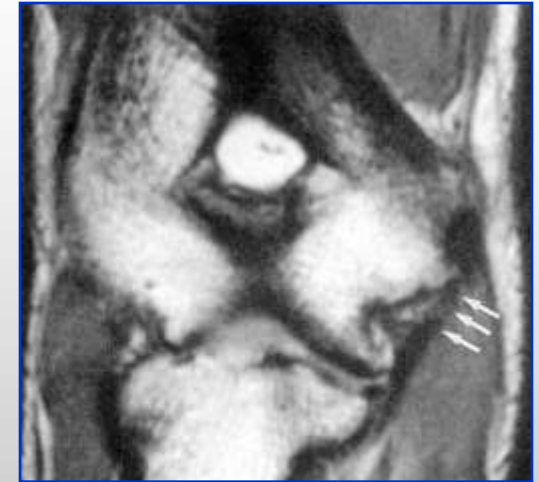
Maximum inward rotation of the throwing arm occurs here.



WILLIAM NEFF / THE PLAIN DEALER

SOURCE: American Sports Medicine Institute

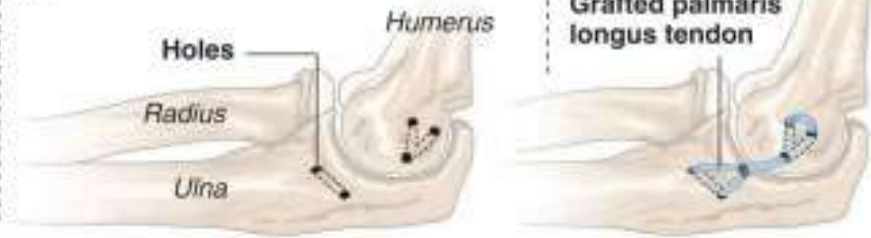
Disaster Strikes!



"Since the invention of the breaking ball, there has been no more significant development in baseball than Tommy John surgery." --Will Carroll, Saving the Pitcher, 2007

How to fix it

- 1** Palmaris longus tendon, a nonessential tendon about 4-6 in. (10-15 cm) long, is removed from opposite forearm
- 2** 3 mm holes are drilled into ends of the humerus and ulna bones
- 3** Tendon is woven back and forth between the holes and stitched together



Acute injuries are on the rise due to:

- 1) Increase in athlete-exposures
- 2) Improper training
- 3) Overlooking safety in practice

What is Overuse?

Overuse is considered excessive and repeated use that results in injury to the bones, muscles or tendons

- 1) Tendonitis
- 2) Stress fractures
- 3) Physeal injuries

What is Overuse?

Physical stress → Remodeling

- Breakdown = Remodeling 😎
- Breakdown > Remodeling 😞

Subtle, occur over time

Often more challenging to
diagnose and treat



Children are playing one sport year round

- Improper conditioning or supervision

Playing coached sports at a much younger age, often playing on several organized teams at the same time

- Extended practice hours
- Intensity can exceed what some young bodies can handle

Overuse injuries account for **HALF** of all sports injuries in middle school and high school.

(Source: Safe Kids USA)



Children are not small adults

Year round play of single sport can lead to over-development of certain muscle groups at the expense of others



Bones, muscles, tendons and ligaments are still growing making them more susceptible to injury

Physes (growth plates) weaker than nearby ligaments and tendons

- Little league elbow or shoulder



Stress!

- “Win at all costs”
- Physical AND psychological overload
- Not mature enough to handle internal stresses (expectation's of one's self) and external stresses (peer, coaches, parents) of competition



Psychosocial Effects?

All sports require different set of athletic and strategic skills and problem solving

Important for children to play different sports and assume different roles

Grandiosity/entitlement

- Travel teams, select teams

A child's history of injury is.....

- A risk factor for future injury during both their youth and adulthood
- A contributor to long term degenerative diseases, such as osteoarthritis.





The Lasting Problem



70% of kids participating in sports drop out by the age of 13

We spend more than **\$2.5 billion** per year caring for injured young athletes

- Lowered academic performance
- Increased risks for depression and smoking
- Loss of sports participation and resultant inactivity
- Potential for future osteoarthritis and associated health issues, including obesity

What Can We Do to Prevent Injuries?

Parents and coaches must recognize that every child is different in terms of their body's ability to adapt to the demands of sports and physical activity, esp. at the higher levels.

Pre-participation Physical Examination

What Can We Do to Prevent Injuries?

Year round conditioning and activity

- Vary sports and activities
- Incorporate strength training, increasing flexibility, and improving core stability

3 month rest period per year from any one particular sport, especially throwing sports!

What Can We Do to Prevent Injuries?

Parents need to be VIGILANT

- Be alert for signs of an injury
- Limp, change in the way they throw or volunteering to take a break or time off
- “When in doubt, keep them out.”

Participate at age and developmentally appropriate level, especially in contact sports.

What Can We Do to Prevent Injuries?

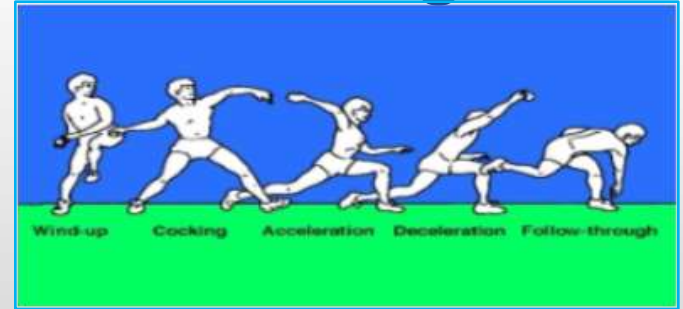
Warm up properly before an activity

- Gradually bring heart rate up from resting level through low impact exercise.
- Stretching routine?

Properly cool down after activity

- Allows heart rate to gradually return to a resting level
- Stretch

Obtain instruction on proper training and technique



Recognize limitations

- Children are not little adults
- Discourage the teaching of curve balls until high school (puberty)
- Ban radar gun in youth sports
- Observe pitch counts
- http://stopsportsinjuries.reingoldweb.com/files/pdf/AOSSM_Baseball.pdf

Increase training gradually

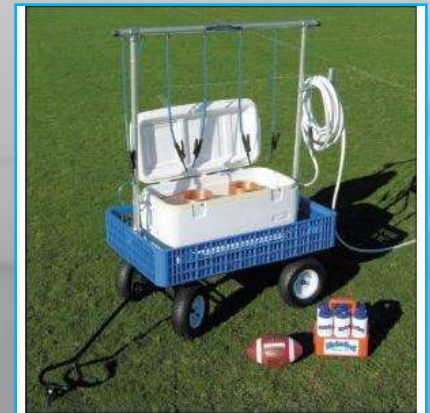
- 10 percent rule
- Do not increase training activity, weight, mileage or pace by more than 10 percent per week
- This allows body ample time to recover

What Can We Do to Prevent Injuries?

Proper fitting equipment

- Make sure shoes fit properly and are in good condition.
- Check protective equipment weekly.

Be sure children drink enough water – one cup every 15 minutes



Encourage participation for fun and limit emphasis on winning → healthy competition



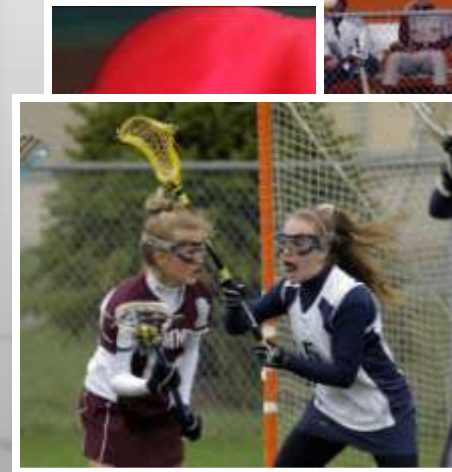
Discourage early specialization.

Treat symptoms of problems/injury
EARLY!



My ONE Campaign

- One Child
- One Team
- One Sport
- One Season



- GOAL – Less time in practice, more FREE play

What Does the Future Hold?

- Better prevention of injury
- New surgical techniques are being evaluated to treat injuries – less invasive
- Ongoing research to understand the injury risk and how to prevent
- Continued rise in injury rates unless education is increased

Let's Work Together to STOP Sports Injuries
And Keep Kids in the Game for Life!

www.STOPSportsInjuries.org

