

34th Annual
Ironman World Championship Medical Symposium

Injury Prevention in Youth Sports

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Conflict of Interest / Disclosure

- I have no relevant financial relationships with the manufacturer(s) of any commercial product(s) and/or provider(s) of commercial services discussed in this CME activity.
- I do not intend to discuss an unapproved/investigative use of a commercial product/device in my presentation.



Objectives

- Review basic principles of injury prevention
- Discuss strategies to reduce risk and promote health in young athletes
- Empower you to create a safer sporting environment and culture for youth athletes

Courtesy: Safe Kids USA

Sports Matter for (and to) Kids...

Sports participation is a
tool for child
development and
health promotion.



State of the Union: A Created Culture

- 348 athletes, boys & girls age 8-14 yrs old
- “Bounties”
 - 11% were offered reward to injure opposing player
 - 16% either they or a teammate tried to hurt another player
 - 30% secretly glad when player on other team got hurt
- Injuries
 - 59% believe it’s part of game & expect it to happen
 - 70% believe they appear “tough” or “cool” by playing hurt
 - 70% played while hurt & 50% hid injury to continue playing
- Reality check
 - Professional sports, media, “us”

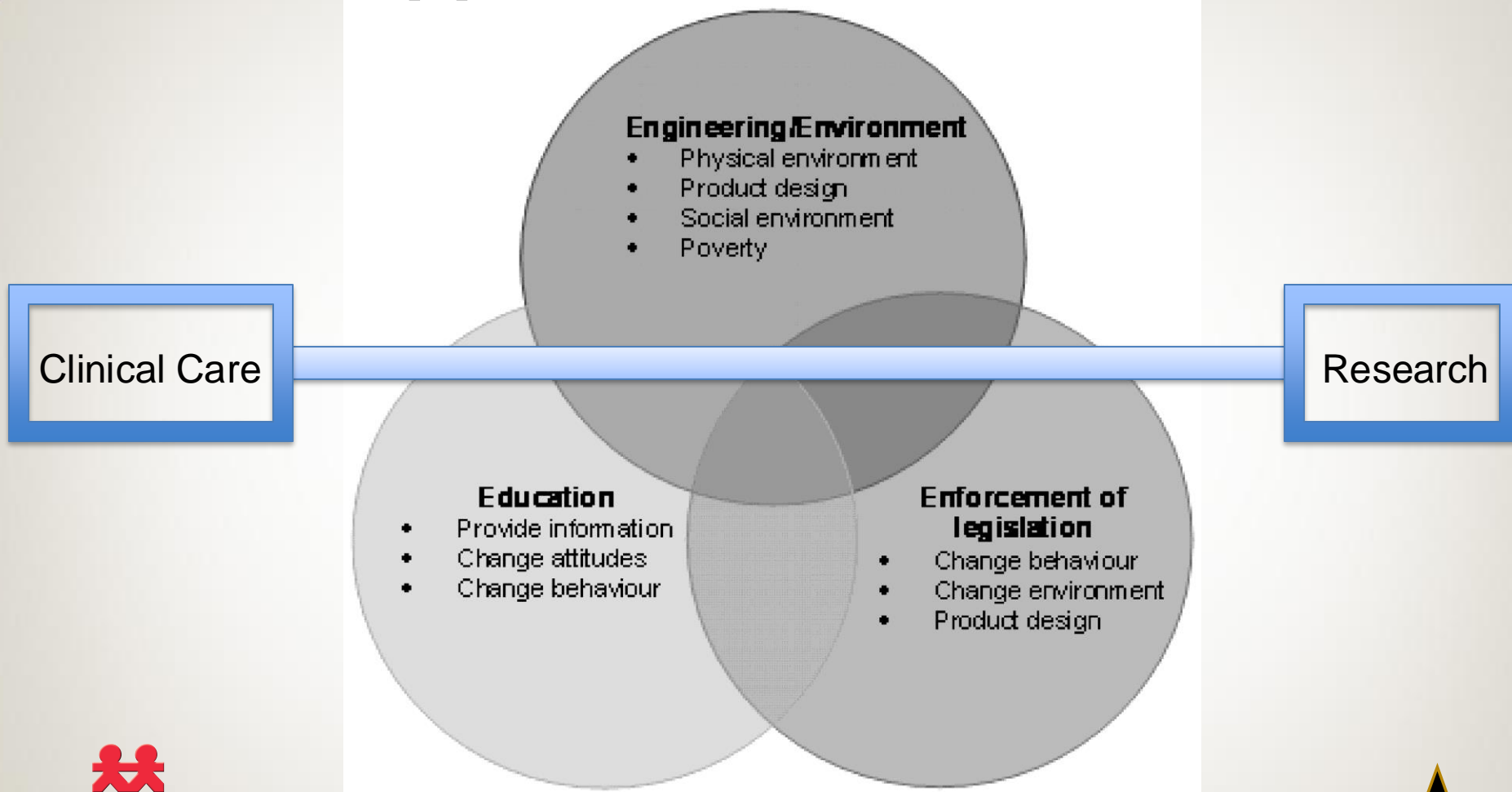
SafeKids Worldwide, 2012.

“Coaching Our Kids to Fewer Injuries: A Report on Youth Sports Safety”

- Misperceptions & uninformed behaviors re: sport safety among parents/coaches remain common



Approaches To Prevention



Three More E's

- Evaluation
- Economic incentives
- Empowerment



Youth Sports: What We Know

The Facts...

- More than 38 million children and adolescents participate in organized sports in the U.S. each year.
 - Another 10 million in some form of athletics
- Estimated 3.5 million children under age 14 receive medical treatment for a sports-related injury each year.
 - HS athletes account for additional 2 million injuries / 500,000 doctor visits / 30,000 hospitalization

ER Data: Sports & Recreation

- US (Gilchrist J et al. MMWR, 2007.)
 - 2.4 million visits/yr (age 5-18)
 - 29% of all unintentional injury visits
- Tennessee (2015)
 - > 34,000 visits/yr (age 5-18)
- Leading cause of presentation for injury among adolescents
 - Emery CA. Epi Ped Sport Injur, 2005.
- NSW population health survey showed only 8.9% of sports injuries treated in hospital setting.
 - Mitchell R. J Sci Med Sport, 2010.

By the Numbers

- Injury reported during sport among athletes age 5-14
 - 28% of football players
 - 25% of baseball players
 - 22% of soccer players
 - 15% of basketball players
 - 12% of softball players

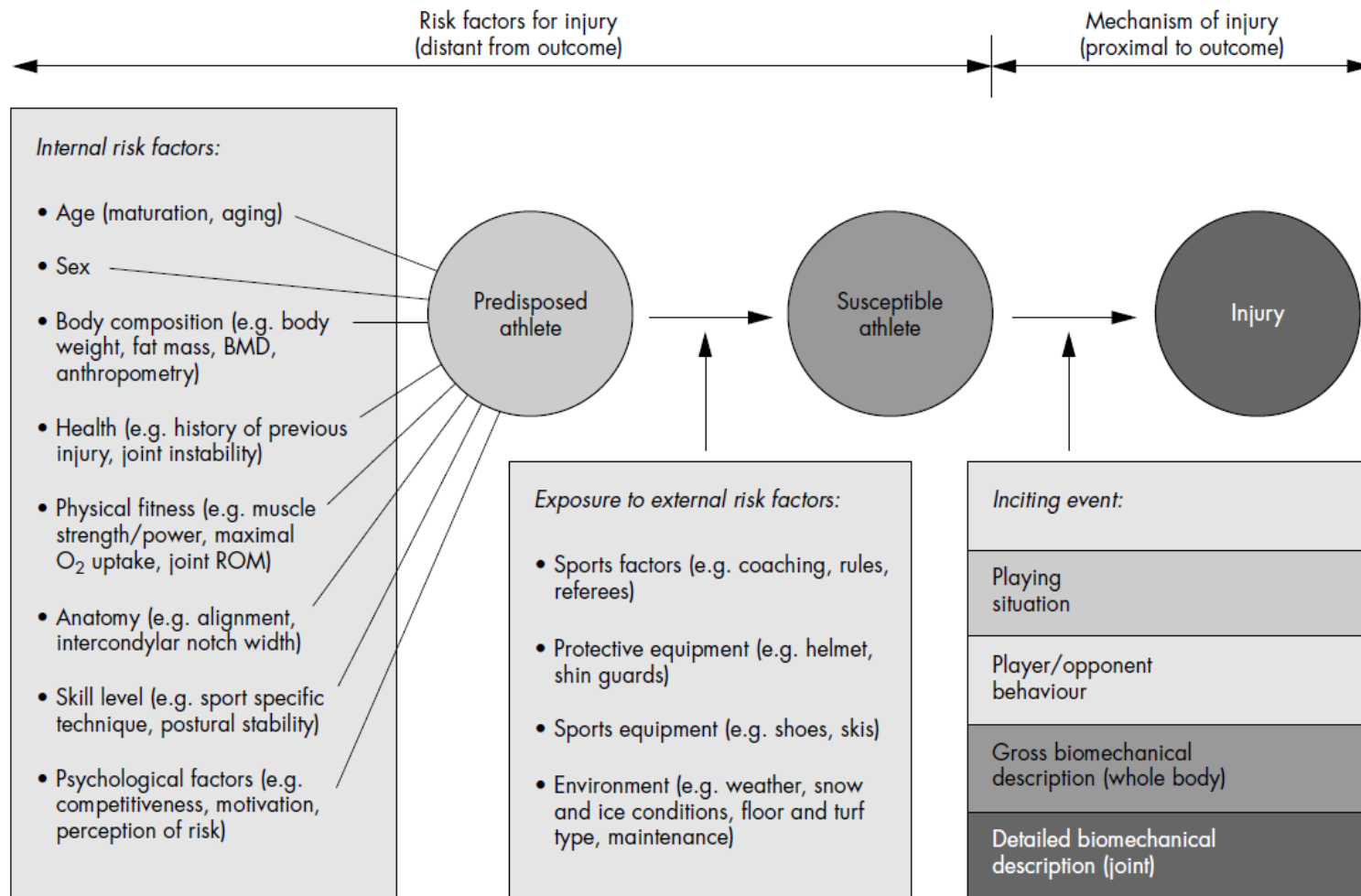


Injury Cascade

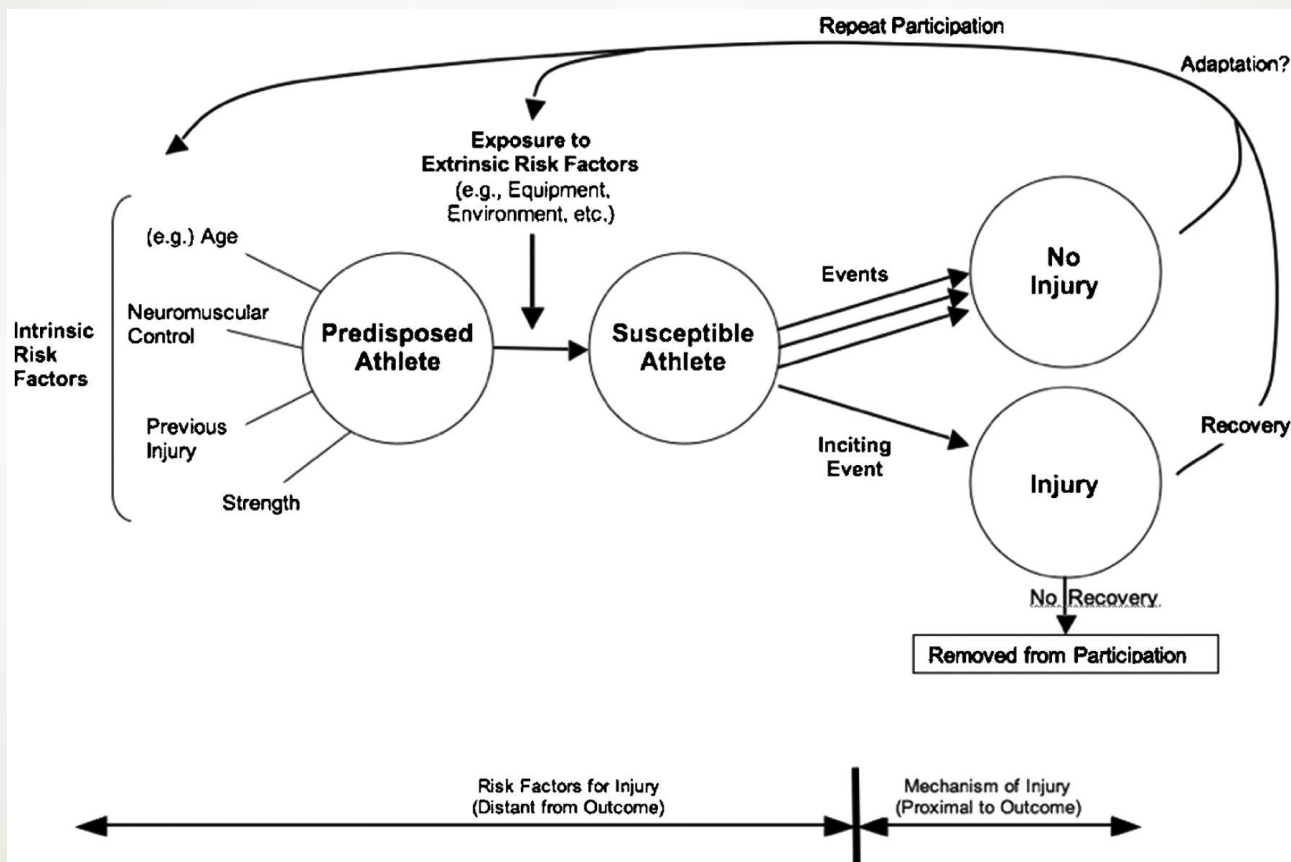
- Injury is potential barrier to physical activity
 - Effects morbidity, mortality, QOL
 - 8% of adolescents drop out of sporting activities/yr due to injury (Grimmer KA et al. J Adolesc Health, 2000.)
 - Loss of physical, mental, social benefits
 - Leading risk for OA development
- High financial burden
 - \$33 billion in sports-related injury healthcare costs (direct + indirect)/yr in US for ages 5-22
 - [Aspe.hhs.gov](https://aspe.hhs.gov) (Mar 16, 2014) & [InjureFree](#) (Aug 28, 2024)

Comprehensive Model for Injury Causation

RISK FACTORS FOR SPORTS INJURY



Etiology of Injury in Athletes



Key Sports Safety Prevention Strategies

- Adherence to rules & limit illegal play
 - 6.4% of overall injuries in 9 HS sports were related to rules transgressions (98,066 injuries/yr)
 - Collins CL et al. Inj Prev, 2008. (RIO)
- Teaching proper fundamentals & technique
- Protective equipment
- Conditioning programs
- Educational & awareness campaigns

Education and Experience Matters

- Competitive Cheerleading
 - Compared to cheerleaders supervised by coaches with low coach education, qualifications and training (coach EQT), cheerleaders supervised by...
 - Coaches with the most EQT had a nearly 50% reduction in injury risk (rate ratio [RR], 0.5; 95% CI, 0.3-0.9),
 - Coaches with medium coach EQT had a nearly 40% reduction in injury risk (RR = 0.6; 95% CI, 0.3-1.2)

Key Sports Safety Topics

CONCUSSION

Concussion Prevention: Equipment

- Football Helmets
- Mouth Guards
- Head Gear



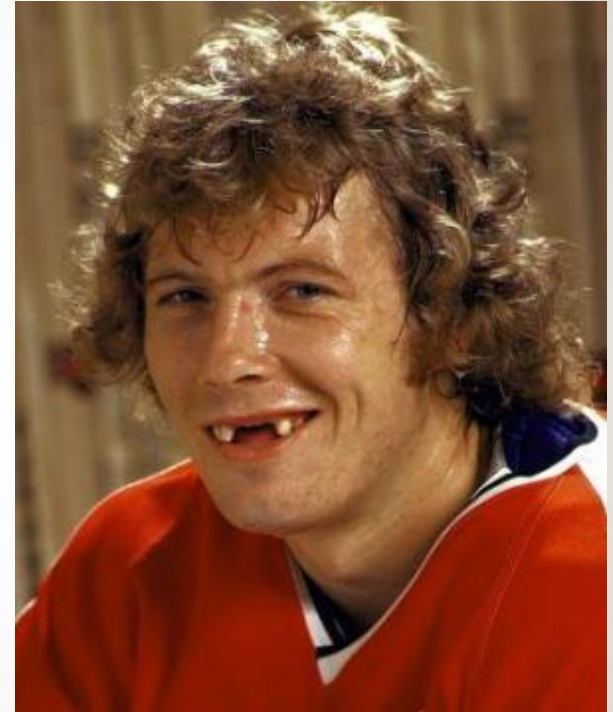
McIntosh AS et al. BJSM, 2011.

Summary of Helmet Benefits in Sports



Mouth Guards

- Labella et al. MSSE, 2002. (LOE 2)
 - Effects of mouth guards on dental injuries and concussion in college basketball.
 - No difference in concussion rate
 - Significantly lower rate of dental trauma
- Emery et al. BJSM, 2017.
 - Meta-analysis of basketball, ice hockey & rugby suggests 19% reduced risk of concussion
 - Not statistically signif



Head Gear in Soccer

- Withnall et al. BJSM, 2005.
 - Three equipment types tested
 - No attenuation of mechanical forces due to heading ball
 - 33% reduction in acceleration forces from direct head-to-head contact
 - Further evidence needed for effect on injury or concussion prevention



Effectiveness of Protective Equipment in Preventing Concussions.

<i>Sport</i>	<i>Equipment Type</i>	<i>Effective?</i>	<i>Highest Level of Evidence</i>
Football	CMO	No	4
Rugby	Mouthguard	No	2
Rugby	Headgear	Inconclusive	2
Soccer	Headgear	No	3
Field hockey	Faceshield	Inconclusive	4
Ice hockey	Faceshield	No	2

CMO = customized mandibular orthotic.



Guardian Cap

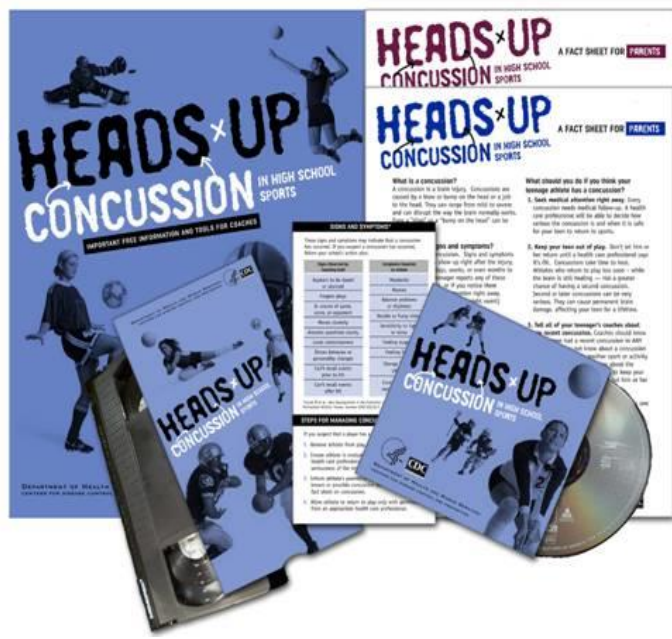
Q-Collar



Courtesy: Julie Gilchrist, MD, FAAP
CDR, US Public Health Service
Division of Unintentional Injury Prevention

CDC's "Heads Up" Initiative

- Goal: Improve prevention, recognition, and response to concussion among young athletes

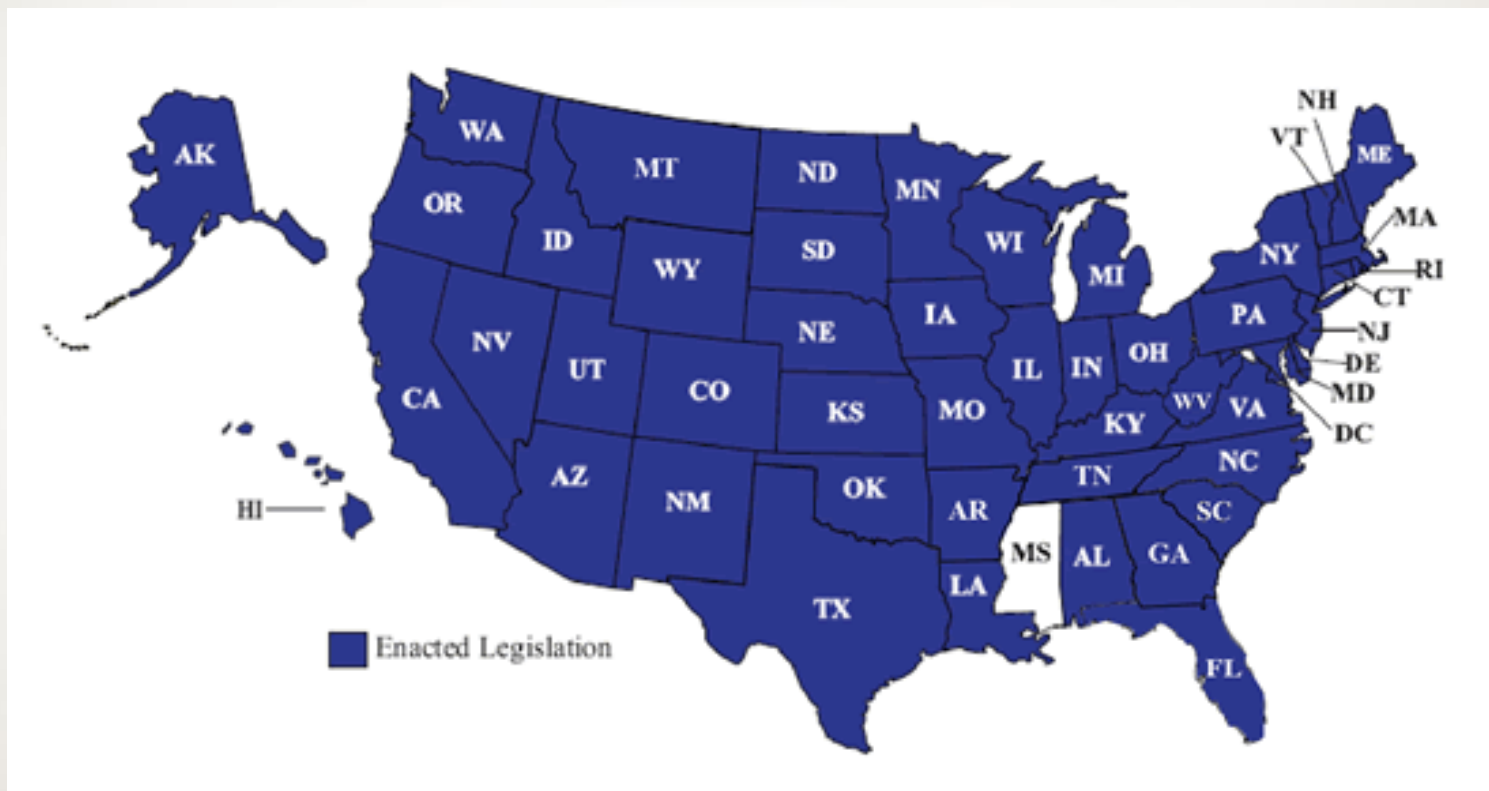


Evaluation: Youth Sports Toolkit

- Changed knowledge, attitudes, behavior
 - 63% viewed concussion more seriously
 - 77% reported more skill in indentifying potential concussions
 - 72% educated others: athletes, parents, other coaches
- Outcome data sparse on injury reduction

National Conference of State Legislatures, March 2013.

Youth Sports Safety Concussion Legislation: State-Level



Key Sports Safety Topics

OVERUSE INJURIES

Overuse Injuries

- Why is it happening more often?
 - Sports specialization at younger ages
 - Intense year round competition and practice
 - Growing bodies more susceptible to injury
 - Parental and coaching pressure and unrealistic expectations
 - Super competitive youth sports culture



Overuse Injuries: Pathophysiology

- Stress / Strain
- Breakdown
- Recovery
- Build-up



Overuse: Prevention Strategies

- Activity modification
 - Avoid playing for multiple teams at same time
 - 1-2 days/wk off from competitive sport or training
 - 2-3 months/yr away from same sport
 - Take at least 1 month off between seasons
 - Play 2 or more sports during the year (rec/organized)
 - Incorporate cross training
 - The ratio of hours spent in organized sport:free play should not exceed 2:1
 - Total hours of organized sports per week should be less than child's age
 - Total hours of athletic activity per week should be 16 hours or less

Key Sports Safety Topics

ANKLE SPRAIN

Lace-Up Braces

- McGuine TA et al. AJSM, 2011 (LOE 1)
 - HS Football & Basketball (M & W)
 - Lower incidence of acute ankle injuries (2-3x)
 - Degree of severity unchanged
 - No effect on other LE injuries
 - Benefit for both 1st time & prior sprain
 - Findings independent of shoe type, taping, field surface

Proprioception

- McGuine T et al. AJSM, 2006. (LOE 1)
 - Injury rate
 - 6.1% balance training program vs 9.9% control
 - 50% risk reduction if prior sprain & perform intervention

Key Sports Safety Topics

ANTERIOR CRUCIATE LIGAMENT TEAR

Neuromuscular Prevention Strategies

- Components of structured “warm-up” program
 - Power (plyometrics)
 - Strength (resistance training)
 - Coordination of muscle recruitment (dynamic stabilization & proprioceptive balance training)
 - Flexibility (stretching)
 - Functional & sport-specific training/agility
 - Esp during preseason conditioning
- Performed individually & in combination
 - Along with technique biofeedback & education

ACL Prevention Programs

- Overall ACL injury reduction (OR=0.40)
- Subgroup analysis revealed clues to max efficacy
 - Combination of pre- and in-season training
 - Minimums: 6 wk preseason, 15-20 min session, 3x/wk
 - Emphasis on plyometric and strengthening exercises
 - Female athletes
 - Under age 18 yrs

Key Sports Safety Topics

SPORT SPECIFIC STRATEGIES

- Safety

- Re
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- Chest

- N
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- Sliding

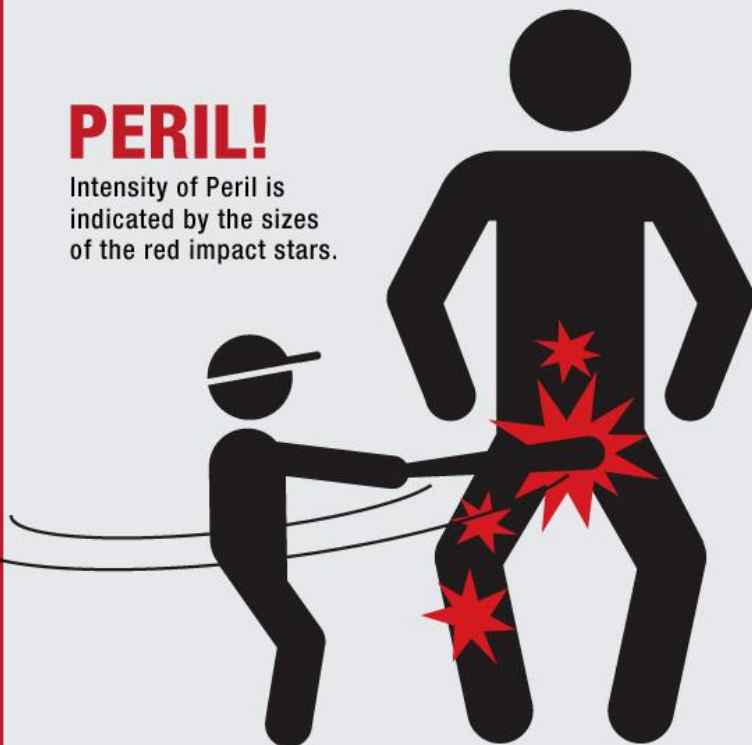
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CHILD SAFETY: PROTECT YOURSELF FROM YOUR CHILD AND CHILDREN!

WARNING:

PERIL!

Intensity of Peril is
indicated by the sizes
of the red impact stars.



WHEN TEACHING A
TODDLER OR CHILD
HOW TO SWING A
BASEBALL BAT, BE
AWARE OF YOUR OWN
BODY'S "STRIKE
ZONE." IT CAN EASILY
BECOME A PERIL-ZONE.

howtobeadad.com



f oculofacial

Inj Prev, 2000.



Ice Hockey

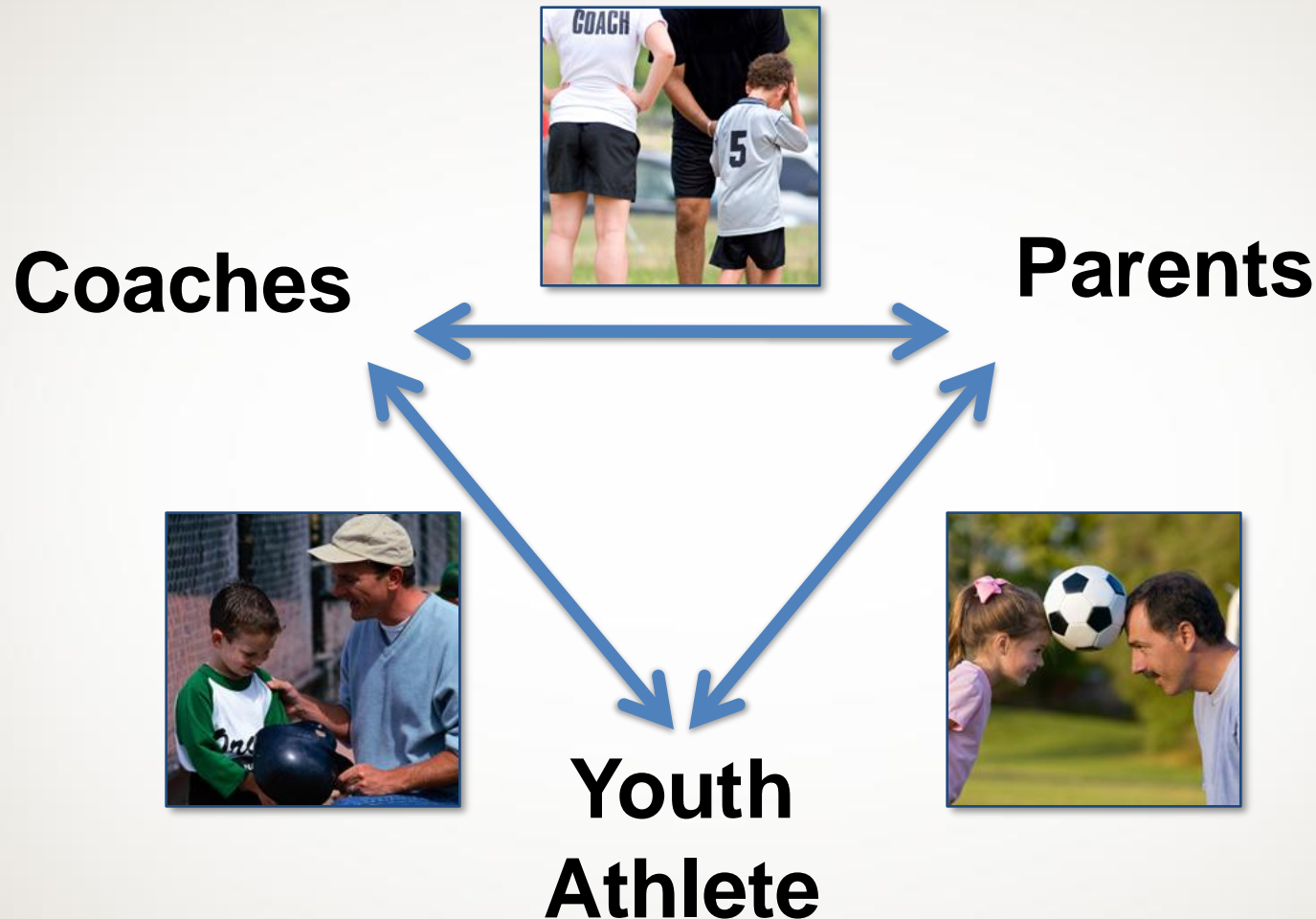
- Facial protection reduces injury risk
 - Stuart MJ et al. AJSM, 2002.
 - Half shield = 2x
 - Full shield = 7x
 - No evidence of risk compensation
- Fatigue
 - Injury increases last 5 min/period & last period
 - Pinto M, et al. Clin J Sport Med, 1999.



Key Sports Safety Topics

PARENTS/COACHES

Parent, Coach and Child: The Athletic Triangle



Estimated Probability of Competing in Athletics Beyond High School

Student Athletes	Men's Basketball	Women's Basketball	Football	Baseball	Men's Ice Hockey	Men's Soccer
High School Student Athletes	545,844	438,933	1,108,441	471,025	36,912	398,351
High School Senior Student Athletes	155,955	125,409	316,697	134,579	10,546	113,815
NCAA Student Athletes	17,500	15,708	67,887	31,264	3,944	22,573
NCAA Freshman Roster Positions	5,000	4,488	19,396	8,933	1,127	6,449
NCAA Senior Student Athletes	3,889	3,491	15,086	6,948	876	5,016
NCAA Student Athletes Drafted	48	32	255	806	11	49
Percent High School to NCAA	3.2%	3.6%	6.1%	6.6%	10.7%	5.7%
Percent NCAA to Professional	1.2%	0.9%	1.7%	11.6%	1.3%	1.0%
Percent High School to Professional	0.03%	0.03%	0.08%	0.60%	0.10%	0.04%



“BURNOUT”

Parents and Coaches Beware!

- 70% of kids participating in organized sports drop-out by age 13
 - Loss of physical & psychosocial benefits
 - Top 3 reasons for quitting
 - Adults
 - Coaches
 - Parents



Parent-Coach Relationship

- Consider using contracts to establish policies for team, coaches and parents
- Provide support and ensure player safety
- Encourage & work with child to do their best
- Remember, the athletes are watching you

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Youth Sports

- Three “big picture” concepts
 - Socialization for lifelong enjoyment
 - Setting for health promotion delivery
 - Safe participation
 - Children & adolescents at increased injury risk
 - High levels of exposure at a time of major physiological change
- Requires attitude adoption
 - Community: Resist shift from child-oriented goals to adult-oriented goals
 - Sports Health Professionals: Prevention-centered thinking



Summary

- We all play a part
- Educate, certify and EMPOWER others to create a safer sporting environment
 - “Pass it on”
- Go beyond awareness...Learn skills to prevent injuries
- Encourage athletes to speak up when hurt
- Support coaches in making the right decisions

Changes You May Wish To Make In Practice

- Provide patients with evidence-based injury prevention program resources
- Encourage families and community leaders to implement risk reduction and health promotion measures as part of youth athletics
- Embrace (safe, positive) sport as a vehicle for physical activity and public health

#1 Adult *and* Children's Hospitals *in the* Southeast.



Thank You



Vanderbilt Youth Sports Health Center
In partnership with Vanderbilt Sports Medicine

