OHIO INJURY PREVENTION PARTNERSHIP

Evidence Based Interventions

Youth Sports Injury

April 2013

Evidence Based Interventions

In recent years, concussions and traumatic brain injury (TBI) have brought sports injury significant media attention, however further work evaluating interventions is still needed. Based on current literature, the majority of effective sports injury interventions fall into three categories including behavioral interventions, environmental interventions, and policy change.

Behavioral Interventions

The first category of intervention addresses the individual athlete. Behavioral interventions are designed to assist the athlete in engaging in activities or behaviors that limit or reduce the risk of injury. The athlete can choose whether or not to adopt this type of intervention. This decision is influenced by parents, coaches, social norms, educational campaigns, policies, and legislation.

The Facts of Sports Injury

In the United States, about 30 million children and teens participate in some form of organized sports, and about 3 million injuries occur each year. Almost one-third of all injuries incurred in childhood are sports-related injuries.[1]

According to the American Academy of Pediatrics and the National Safe Kids campaign:[1]

- Although death from a sports injury is rare, the leading cause of death from a sports-related injury is a brain injury.
- The highest rates of injury occur in sports that involve contact and collisions.
- Most organized sports-related injuries (60%) occur during practice.
- More severe injuries occur during individual sports and recreational activities.

One of the most effective behavioral interventions is the **use of protective equipment**. Helmets, elbow pads, wrist guards, mouth guards, and ankle braces are all examples of equipment that can be used to reduce the occurrence and severity of injury. To be effective, equipment should be appropriate to the sport and player, maintained in good condition, fit the player correctly, and used consistently.[2] Parents and coaches should be involved to ensure proper use. Equipment should be used in recreational activities and organized sports. In recreational sporting events, policies may not be present to require the appropriate use of gear.[2] However, in organized sports, it is not effective to simply make the equipment available; it must be mandated for universal implementation.[2]

An additional type of effective behavioral intervention **increases the physical fitness level of the athlete**. Research studies in football and soccer have shown that strength training, conditioning, and balance training can reduce injuries.[3] In a research study that focused on military trainees, those with higher levels of aerobic physical fitness were less likely to be injured than their less fit peers.[4]

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Environmental Interventions

While behavioral interventions address the athlete's action within the sport, environmental interventions are designed to ensure that the sport is being played in a setting that minimizes the risk for injury. Research has shown that injuries can be reduced by **altering how an athlete encounters their surroundings**.[2] Examples of effective environmental interventions include providing dedicated park areas for bicycles and skateboards, providing adequate lighting for evening events such as baseball games, and installing quality surfaces for playgrounds and playing fields.[2]

Sport specific environmental interventions have also been proven effective. In baseball and softball, breakaway bases reduce sliding injuries.[5] Anchored soccer goals reduce the number of players injured by falling, moveable goals.[6] In addition, general field maintenance to decrease the number of holes, grates, and rocks from the playing surface, and removing objects around the perimeter of the field during play can also help to reduce injury to the athlete.[7]

Policy Change The final category of effective intervention is policy change. **Injury prevention policies and legislation** are powerful tools to change the social norm regarding injury prevention behaviors.[2] Bicycle helmet legislation is historically the most implemented sports injury policy. In recent years, the passage of concussion safety laws has accelerated, and in 2012, Ohio became the forty second state to enact this type of legislation. Legislation, such as Ohio's Return to Play Law, should be accompanied by education and enforcement to be effective. Without these components, compliance may be less than optimal.[2]

Policy can also be effectively enacted at the community level. Teams, athletic organizations, and schools can establish policies requiring athletes to wear protective equipment and participate in fitness training or skill development. Mandated coaching education has also been proven effective.[8] Rule changes that advocate for fair play and prohibit techniques designed to incur injury such as spearing in football are effective when paired with consistent refereeing.[9]

Sources: 1) National Orthopedics and Neurosurgery. http://www.nationalorthoandneuro.com/how-frequently-do-sports-injuries-occur.html; 2) Liller, Karen. Injury Prevention for Children and Adolescents: Research, Practice, and Advocacy, 2nd Edition. APHA Press, 2012. Print.; 3) MacKay M, Scanlan A, Olsen L, et al. 2004. Looking for evidence: a systematic review of prevention strategies addressing sport and recreational injury among children and youth. *J Sci Med Sport*. 7:58-73.; 4) Gilchrist J, Mandelbaum BR, Melancon H, et al. 2008. A randomized controlled trial to prevent noncontact anterior cruciate ligament injury in female collegiate soccer players. *Am J Sports Med*. 36.8:1476-1483.; 5) Bixler, B, Jones RL. 1992. High school football injuries: effects of post-halftime warm-up and stretching routine. *Fam Pract Res J*. 12:131-139.; 6) National Research Council, Committee on Youth Population and Military Recruitment. 2006. *Assessing Fitness for Military Enlistment: Physical, Medical, and Mental Health Standards*. Sackett PR, Mavor AS, editors. Board on Behavioral, Cognitive, and Sensory Sciences, Division of Behavioral and Social Sciences and Education. Washington, DC: National Academies Press.; 7) Janda DH, Wojtys EM, Hankin FM, et al. 1990. A three-phase analysis of the prevention of recreational softball injuries. *Am J Sports Med*. 18:632-635.; 8) Sendre RA, Keating TM, Hornak JE, Newitt PA. 1994. Use of the Hollywood impact base and standard stationary base to reduce sliding and base-running injuries in baseball and softball. *Am J Sports Med*. 22:450-453.; 9) Mueller FO, Cantu RC, Van Camp SP. 1996. Catastrophic injuries in high school and college sports. Human Kinetics, Champaign, IL: HK Sports Science Monograph Series. 8.; 10) Injury Free Coalition for Kids. http://www.injuryfree.org/resources/SportsSafetyProblem.pdf; 11) Blyth CS, Mueller FO. 1974. Football injury survey 3. Injury rates vary with coaching. *Phys Sportsmed*. 2:45-50.; 12) Mueller FO, Blyth CS. 1987. Fatalities from head and cervical spine injuries occurring in tackle football: 40 years' experience. *Clin Sports Med*. 6:185-196.; 13) Torg JS, Truex R Jr, Quedenfeld TC, et al. 1979. The National Football Head and Neck Injury Registry: report and conclusions 1978. *JAMA*. 241:1477-1479.; 14) Torg JS, Vegso JJ, Sennett B. 1987. The National Football Head and Neck Injury Registry: 14-year report on cervical quadriplegia (1971-1984). *Clin Sports Med*. 6:61-72.

Evidence Based Interventions to Prevent Sports Injuries

Sport	Proven	Promising/Potential
Baseball/Softball	• Breakaway bases • Reduced impact balls • Faceguards/protective eyewear	• Batting helmets • Pitch counts
Basketball	• Mouth guards	• Ankle disc training • Semi-rigid ankle stabilizers/ braces • Protective eyewear
Bicycling	• Helmets	• Bike paths/lanes • Retractable handle bars
Football	• Helmets and other personal protective equipment • Ankle stabilizers/braces • Minimizing cleat length • Rule changes • Playing field maintenance • Preseason conditioning • Cross-training • Coach training and experience	• Limiting contact during practice
Ice hockey	• Helmets with full face shield • Rule changes • Increased rink size	• Enforcement of rules • Discouraging fighting
In-line skating/Skateboarding	• Wrist guards • Knee/elbow pads	• Helmets
Playgrounds	• Shock-absorbing surfacing • Height standards • Maintenance standards	
Running/Jogging	• Altered training regimen	• Shock-absorbing insoles
Skiing/Snowboarding	• Training to avoid risk situations • Adjustable bindings • Wrist guards	• Helmets
Soccer	• Anchored, padded goal posts • Shin guards • Neuromuscular training programs • Strength training	

This chart provides evidence based strategies compiled by a group of safety and injury prevention experts. Proven interventions have been supported by two or more well-designed studies or systematic review. Promising strategies are those supported by one well-designed study. **Source:** Adapted from Gilchrist, J., Saluja, G., & Marshall, S.W. 2007. Interventions to prevent sports and recreation-related injuries. In L.S. Doll, S.E. Bonzo, J. Mercy, & D.A. Sleet (eds), *Handbook of injury and violence prevention* (pp. 117-136). New York: Springer.