

ORGANIZED youth sports in the U.S. and most of North America are relatively safe endeavors in which the benefits far outweigh the risks. On the individual level, even less-organized sports have enormous physical and emotional benefits that, in all but the most extreme cases, weigh in favor of the activity. That is not to say that life-altering catastrophic events never occur. Although rare, terrible sports-related tragedies do happen. Most are preventable by making a concerted effort on many fronts. Of the preventive measures available, proper training, coaching, supervision, and quick medical care are almost always the key steps to be taken. It is the role of protective sports equipment, those who build it, and the organizations that create the methods to judge their potential effectiveness to be the final defense in minimizing the occurrence of tragic events. Even under the best circumstances, there are times when nothing can prevent heartbreaking injuries or even death.

Standards in North America usually can be described as falling into one of several categories. Government (such as those mandated by the Consumer Products Safety Commission) and voluntary or industry standards are the most common. Of voluntary standards, the ones that are mandated by a particular governing body seem to be the most effective. As an example, if a piece of personal protective equipment is required for some type of play, like a Hockey Equipment Certification Council (HECC)-certified helmet by USA Hockey (the national governing body), it is a good bet players will wear such equipment because the rules prohibit participation without doing so. Governing bodies, however, rarely write or create such standards because that is not in their area of expertise. Rather, they will rely upon other organizations, such as the American Society for Testing and Materials (ASTM), which has over 30,000 members and is well-respected for its consensus standards, to arrive at a viable and effective one.

Others, such as the National Operating Committee on Standards for Athletic Equipment (NOCSAE), operate using a smaller format. This more-limited group is capable of setting standards much more quickly than the consensus approach allows. It could be argued that this second approach involves less input from concerned parties, but a "public" review period prior to actual implementation eliminates most of this criticism. On the plus side, these smaller groups can sometimes act in the best interest of the athlete with less political maneuvering from outside groups that may fear the effects of any change in a stan-

SEEKING TO MAKE YOUTH SPORTS SAFE

BY P. DAVID HALSTEAD

Protective equipment, standards, and common sense are keys to preventing serious injury.

dard. Both approaches can and do work very well.

Some of the most effective systems use yet another layer to implement standards. HECC, for instance, does not set standards, but instead will adopt for use those set by, say, ASTM. HECC then will oversee the certification process that must be successfully completed in order to earn the mark of the Council. In these cases, the governing bodies will require that the products be marked as such by HECC before they can be used for competitive play. For example, USA Hockey requires that helmets and face shields be certified by HECC in order for them to be worn for play in a league under its oversight and/or control.

The act of setting standards is complex and can be difficult. The process involves the cooperation of many, but is rewarding when a standard that may save a life or prevent a catastrophic injury is implemented. Almost anyone can participate in this process. If you have an interest in doing so, simply contact the certifying or governing body for this activity and pitch in. Even if you have no technical know-how, but simply love and understand the sport, your input will be welcome.

Protective equipment can range from a simple batting glove to a sophisticated head-

protection system. Typically, standards are only prepared for those items that can affect the incidence or magnitude of a serious injury. For instance, there are no standards on athletic supporters, shin guards, or shoulder pads. Some actions for these products are underway in a variety of organizations, but the perceived need is less than in areas like head protection. It is important to note, though, that these nonstandardized devices can and usually do work well.

Some very important pieces of nonstandardized equipment seem to have fallen off the radar screen in recent years: genital protectors. Even though they are available for male and female participants of contact sports, I am informed on a regular basis by coaches and parents that these devices are no longer in widespread use. Injuries to these delicate tissues are not only painful, but can have significant effects on the lives of those injured, as well as their families. The protective devices currently on the market are effective and should be used in contact sports.

While I am not an expert in child development and do not know exactly when youngsters should begin to wear genital protection, I am convinced it should be a part of the protective wardrobe from an early, pre-pubescent age. In the case of athletes engaged in high-speed water sports (water ski jumping, barefoot water-skiing, or riding some types of personal water craft), protection, even if in the form of a wet suit of substance, is very important. In some cases, female athletes may be more at risk from the hydraulic effects of high-speed water sports than males. Children involved in martial arts should begin to use genital protection at the outset of contact.

In most cases, personal protective equipment grew out of a need, and the process often was simple. If you got hurt, you put some padding on the spot in the hope it would prevent further injury. If that did not work, you might add a hard shell over the padding in the form of a simple helmet, shoulder pad, shin pad, etc. In many instances, that is all that is needed.

In some areas of the body, however, a deep understanding of the biomechanics of an injury is called for. Head trauma is perhaps the best example.

There are at least two major causes of the closed head injuries suffered by athletes. One is triggered by linear acceleration and deceleration in a straight line, such as the sudden stop when a head hits the ground at the end of a fall.

The other type is rotational or angular acceleration. Perhaps the best example of this

ay be what has come to be called "shaken baby syndrome," which may result from shaking or rapidly rotating the head—either side to side or up and down, or nearly any combination of the two. The causes of these injuries, whether in a baby or an adult, are so far not understood as well. Threshold injury values for linear acceleration are estimated with some degree of scientific certainty, but rotational injury is less well-documented. Work in that area is progressing, and a better understanding of threshold limit values might be forthcoming during the next several years.

In the typical serious head trauma, it is likely that both these injury mechanisms are present. From the protective equipment standpoint, this is a potential quandary. In the rotational type of injury, a helmet may be of little or no value. In fact, having the added mass of a helmet on your head may be a bad thing, depending on a variety of factors. For example, in a violent rotation like shaken baby syndrome, where there is no risk of head impact, but the head motion is very violent and variable in force and direction, the mass of the helmet on the head would tend only to increase the momentum and thus the damage to the brain. This, of course, assumes that the mass of the helmet is not sufficient to prevent the motion from being initiated in the first place. In the case of football, say, not having the helmet represents such a known and obvious risk from linear acceleration injury that you must wear one. Since a helmet that is there when you need it and not when you don't—a force field, so to speak—has not yet been designed, an understanding of the mechanics involved and the resultant tradeoffs that have to be made is required.

One such example is the "softer" baseball. It is true that softer baseballs that meet the NOCSAE standard reduce the risk of trauma should you be struck on your unprotected head by one at a high speed. Using this type of ball, however, may not affect the risk of *commotio cordis*, a sudden stopping of the heart due to an impact to the torso. It is even possible that, in some scenarios, a softer ball may be more likely to trigger this rare cardiac response than a harder ball would. Good research is being done in this area and seems to show that both ball speed and stiffness are relevant as causes for such an occurrence. For arguments sake, let us assume that, in some cases, the ball hitting the unprotected player's chest and causing a bruise or even a bone break may not be the type of impact that results in the cardiac cycle becoming upset. If so, we must assume that using a vest or softer

ball may reduce the impact to the player, but, in doing so, might put that impact in the range that is most likely to cause cardiac arrest. If that proves to be correct, we must be careful not to turn the big bruiser impact into a smaller deadly one. With that said, the real issue may be the timing of the impact and, for that reason, until we know more, the softer ball is likely the best choice to reduce all types of injury for the youngest ballplayers.

Softer balls, though, may pose an increased risk of eye injury. Research has found that, at most levels, a softer ball is as safe as a hard ball, but either could cause a problem. In racket sports, it is well known that soft hollow balls, while not likely to cause head injury, can be blinding. When the ball is soft enough and moving at such a speed that it deforms and intrudes upon the eye socket, the eye may be displaced or ruptured, with the potential for permanent damage. Protective eyewear that meets ASTM requirements for racquet sports and satisfies the standards of the Protective Eyewear Certification Council should be used for these sports. It is premature to recommend this type of eyewear for baseball, but, if your child has any special eye problems, seek the advice of an ophthalmologist. Rattling helmets with faceguards are one way of offering some eye protection. As a general-

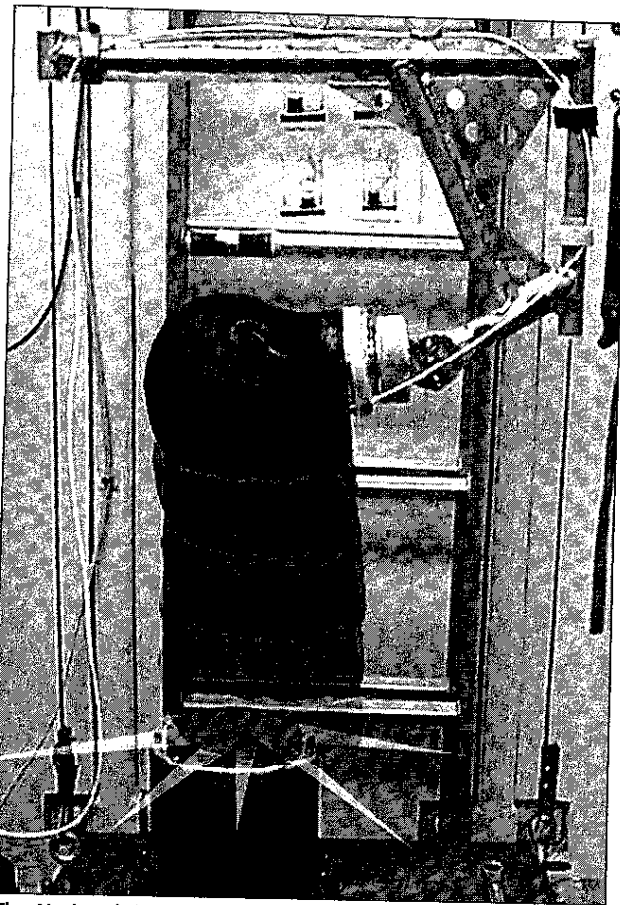
rule of thumb, high-quality protective equipment independently certified for the activity your child is participating in is the best choice.

There is no substitute for common sense. It is the most important tool to prevent sports-related injury. Examples are everywhere. Good coaching and learning the fundamentals of the game are vital no matter what the sport. One example of the lack of common sense falls in the hard-to-believe-but-true category. Some youth league baseballs—which are not specifically marked as being softer, a "safety ball," or a reduced injury ball—turn out to be harder in compression measurements than major league balls are! When asked why this is the case, manufacturers have pointed out that the life expectancy of a major league ball is just a few pitches, but a ball at the youth level is expected to last several games. In order to improve durability and shape over the longer expected life, manufacturers have used more durable materials or manufacturing processes that can lead to a much stiffer ball. Recently promulgated standards at the youth league level to limit ball stiffness would eliminate this concern.

Since the knowledge of the effects caused by repetitive injury has been well-documented, I am always amazed when I get a call along the lines of "My son has had several concussions playing football. What brand of helmet should I get for him?" My answer is, "A good golf hat to go with his clubs so he can stop playing football. The risk of reinjury, with permanent and potentially catastrophic effects, is very high in a player who has experienced this number of head injuries." The risk of reinjury and the cumulative effects of brain injury on athletes in all contact/collision sports are well-known, but, even so, individuals continue to play hurt beyond all reason.

Common sense, good coaching, good officiating, some old-fashioned fitness habits (including proper hydration), and skill in the fundamentals remain the best injury prevention tools we have. For instance, in baseball, at least in my opinion, the best piece of protective equipment a fielder has is a glove and knowing how to use it. It must be remembered, though, that even with good coaching, top-notch equipment, and best efforts on the part of all, injuries can and will occur. The object is to prevent them wherever possible and minimize their impact should they occur. ★

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Courtesy of Southern Impact Research Center

The National Operating Committee on Standards for Athletic Equipment runs a Drop System test to determine results of impact on the human brain when someone's head is brought to an abrupt stop by collisions at various speeds.