Protective Eyewear for Young Athletes

American Academy of Pediatrics Committee on Sports Medicine and Fitness and American Academy of Ophthalmology Committee on Eye Safety and Sports Ophthalmology

The American Academy of Pediatrics and the American Academy of Ophthalmology recommend mandatory protective eyewear for all functionally one-eyed individuals and for athletes who have had eye surgery or trauma and whose ophthalmologists recommend eye protection. Protective eyewear is also strongly recommended for all other athletes.

BACKGROUND

More than 41 000 sports-related and recreational eye injuries were treated in hospital emergency departments in 1993.[1] Seventy-one percent of the injuries occurred in individuals younger than 25 years; 41% occurred in individuals younger than 15 years; and 6% occurred in children younger than 5 years. Children and adolescents are particularly susceptible to injuries because of their fearless manner of play and their athletic immaturity.[2–4]

Ten sports or sports groupings are highlighted in this statement based on their popularity and the high incidence of eye injuries (see Table 1).[1] Baseball and basketball are associated with the most eye injuries in athletes 5 to 24 years old.[5] Participation rates and information on the severity of the injuries are unavailable, however; therefore, the relative risk of significant injuries cannot be determined for various sports.

The high frequency of sports-related eye injuries in young athletes indicates the need for an awareness among athletes and their parents of the risks of participation and of the availability of a variety of approved sports eye protectors. When properly fitted, appropriate eye protectors have been found to reduce the risk of significant eye injury by at least 90%.[4,6,7]

EVALUATION

It would be ideal if all children and adolescents wore appropriate eye protection for all sports and recreational activities. All youth involved in organized sports should be encouraged to wear appropriate eye protection.

Physicians must strongly recommend that athletes who are functionally one-eyed wear appropriate eye protection during all sports and recreational activities. (Functionally one-eyed athletes are those with a best-corrected visual acuity of worse than 20/40 in the poorer-seeing eye, assuming that adequate amblyopia [lazy eye] therapy has been accomplished.)[4,5,8]

If the better eye is severely injured, functionally monocular athletes will be severely handicapped. In many states, they cannot obtain drivers' licenses.[9]

Athletes who have had eye surgery or trauma to the eye may have weakened eye tissue that is more susceptible to injury.[10] These athletes may need eye protection and should be evaluated and counseled by an ophthalmologist.

Various kinds of eye protection are described below and in the Glossary. Different brands of sports goggles vary significantly in the way they fit. An experienced ophthalmologist, optometrist, or optician can help an athlete select appropriate goggles that fit well.

Indigent athletes may have trouble affording eye evaluations or protective eyewear. Sports programs may have to assist these athletes in the evaluation process and in obtaining protective eyewear.

RECOMMENDATIONS

To implement the policy, we recommend the following specific interventions:

1. Appropriate protective eyewear for low–eye risk sports (see Table 2) consists of an approved street-wear frame that meets American National Standards Institute (ANSI) standard Z87.1 with polycarbonate or CR-39 lenses. A strap must secure the frame to the head. These glasses must be fitted by an experienced ophthalmologist, optometrist, or optician.

2. Appropriate protective eyewear for high–eye risk sports is itemized in Table 2. The sports goggles must have lenses made of polycarbonate, which is stronger than CR-39 plastic. An experienced ophthalmologist, optometrist, or optician must fit these goggles.

Because some children have narrow facial features, they may be unable to wear even the smallest sports goggles. These children must be fitted with approved street-wear frames described for low–eye risk sports.

Athletes with a high range of refractive error cannot use lenses made of polycarbonate. They may wear contact lenses (high power) protected by sports goggles with polycarbonate plano (nonprescription) lenses.

For sports in which face masks or helmets with eye protectors or shields must be worn, we strongly recommend that functionally one-eyed athletes also

The recommendations in this statement do not indicate an exclusive course of treatment or serve as a standard of medical care. Variations, taking into account individual circumstances, may be appropriate.

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TABLE 1. Estimated Sports and Recreational Eye Injuries: 1993*

Sport/Recreation Activity	Estimated Injuries	Age Group		
		<5 y	5–14 y	15–24 y
Basketball	8521	112	2241	3413
Baseball	6136	363	3150	1407
Swimming and pool sports	3439	43	1608	729
Racquet and court sports	3183	34	668	1064
Football	2197	0	1097	998
Ball sports (unspecified)	1749	194	743	320
Soccer	1319	0	731	365
Golf	969	43	486	112
Hockey (all types)	946	19	342	515
Volleyball	821	0	180	263
Total selected sports	29 280	808	11 246	9186
Other sports and recreational activities	11 751	1457	3483	2977
Total	41 031	2265	14 729	12 163

* Reprinted with permission from Prevent Blindness America (formerly National Society to Prevent Blindness), *1993 Sports and Recreational Eye Injuries*.[1]

TABLE 2. Sports With High Risk of Eye Injury With Appropriate Eye Protectors

Sport	Eye Protection*
Badminton	Sports goggles with polycarbonate lenses
Baseball	Polycarbonate face guard or other certified safe protection attached to helmet for batting and base running; sports goggles with polycarbonate lenses for fielding
Basketball	Sports goggles with polycarbonate lenses
Bicycling (LER)†	Sturdy street-wear frames with polycarbonate or CR-39 lenses
Boxing	None is available
Fencing	Full face cage
Field hockey (both sexes)	Goalie, full face mask; all others, sports goggles with polycarbonate lenses
Football	Polycarbonate shield on helmet
Full-contact martial arts	Not allowed
Handball‡	Sports goggles with polycarbonate lenses
Ice hockey	Helmet and full face protection
Lacrosse (male)	Helmet and full face protection required
Lacrosse (female)	Should at least wear sports goggles with polycarbonate lenses and have option to wear helmet and full face protection
Racquetball‡	Sports goggles with polycarbonate lenses
Soccer	Sports goggles with polycarbonate lenses
Softball	Polycarbonate face guard or other certified safe protection attached to helmet for batting and base running; sports goggles with polycarbonate lenses for fielding
Squash‡	Sports goggles with polycarbonate lenses
Street hockey	Sports goggles with polycarbonate lenses; goalie, full face cage§
Swimming and pool sports	Swim goggles recommended
Tennis, doubles	Sports goggles with polycarbonate lenses
Tennis, singles	Sturdy street-wear frames with polycarbonate lenses
Track and field (LER)	Sturdy street-wear frames with polycarbonate or CR-39 lenses
Water polo	Swim goggles with polycarbonate lenses
Wrestling	None is available

* For sports in which face masks or helmets with eye protection are worn, functionally one-eyed athletes and those with previous eye trauma or surgery for whom their ophthalmologists recommend eye protection must also wear sports goggles with polycarbonate lenses to ensure protection.
† LER indicates low eye risk.
‡ Goggles without lenses are not effective.
§ A street hockey ball can penetrate into a molded goalie mask and injure an eye.

wear sports goggles with polycarbonate lenses to ensure protection. The helmet must fit properly and have a chin strap for optimal protection.

3. Contact lenses offer no protection; therefore, we strongly recommend that athletes who wear contact lenses also wear appropriate polycarbonate eye protection over the lenses. Polycarbonate (plano) nonprescription lenses should be used in street-wear frames for low–eye risk sports or in sports goggles for high–eye risk sports.

4. Athletes must replace sports eye protectors that are damaged or yellowed with age, because they may have become weakened.

5. Functionally one-eyed athletes and those who have had eye injuries or surgery must not participate in boxing, wrestling, and full-contact martial arts. Eye protection is not practical in boxing or wrestling and is not allowed in martial arts.

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GLOSSARY

CR-39 lenses. Lenses made of an allyl-resin plastic (CR-39 is a registered trademark of PPC Industrial) with a center thickness of 3 mm that meet or exceed ANSI standard Z87.1. They are used for strong prescriptions (above −8.00 sphere and −4.00 cylinder) for which polycarbonate is not suitable. Lenses made from this plastic are not as strong as those made with polycarbonate and should not be used in sports goggles for high–eye risk sports.

Polycarbonate lenses. Prescription or nonprescription lenses made of polycarbonate material with a center thickness of at least 2 mm that meet or exceed ANSI standard Z87.1. These are designed to fit in street-wear frames as well as sports goggles.

Polycarbonate shields and face guards. Molded protective shields and face guards designed to be a part of, or to be attached to, various sports helmets.

Sports goggles. Unhinged protective eyewear with a molded frame and temple with prescription or nonprescription polycarbonate lenses with a center thickness of 3 mm. An elastic band secures the goggles to the athlete's head.

Street-wear frames. Sturdy daily wear frames with a posterior lip to prevent inward displacement of the lenses. They should meet ANSI standard Z87.1.

RESOURCES

American Academy of Ophthalmology, Department ESC, Attention: Inquiry Clerk, PO Box 7424, San Francisco, CA 94120–7424 (*Eye Safety for Children* brochure, include a self-addressed, stamped, legal-size envelope with each request); and Prevent Blindness America (formerly National Society to Prevent Blindness), 500 E Remington Rd, Schaumburg, IL 60173.

Standards: American National Standards Institute, 11 West 42nd St, New York, NY 10036 (Practice for Occupational and Educational Eye Face Protection [ANSI standard Z87.1]); American Society for Testing and Materials, 100 Barr Harbour Dr, West Conshohoken, PA 19428 (Face Guards for Youth [ASTM standard F910–86] and Specifications for Eye Protectors for Use by Players of Racquet Sports [ASTM standard F803–88]; and American Hockey Association of the United States, Canadian Amateur Hockey Association, and Canadian Standards Association (Hockey Helmets and Face Guards).

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