AMERICAN ACADEMY OF PEDIATRICS

Committee on Injury and Poison Prevention

Bicycle Helmets

ABSTRACT. Bicycling remains one of the most popular recreational sports among children in America and is the leading cause of recreational sports injuries treated in emergency departments. An estimated 23 000 children younger than 21 years sustained head injuries (excluding the face) while bicycling in 1998. The bicycle helmet is a very effective device that can prevent the occurrence of up to 88% of serious brain injuries. Despite this, most children do not wear a helmet each time they ride a bicycle, and adolescents are particularly resistant to helmet use. Recently, a group of national experts and government agencies renewed the call for all bicyclists to wear helmets. This policy statement describes the role of the pediatrician in helping attain universal helmet use among children and teens for each bicycle ride.

ABBREVIATIONS. ANSI, American National Standards Institute; ASTM, American Society for Testing and Materials; CPSC, Consumer Product Safety Commission.

BACKGROUND

Bicycling continues to be one of the most popular recreational sports in America. An estimated 44.3 million children younger than 21 years ride bicycles in the United States.[1] It is a clean, efficient mode of transportation for children to make short neighborhood trips, and bicycling can be an enjoyable form of aerobic physical activity for children and adolescents.

As with all physical activities, bicycling is not without hazards. Children are at risk of injury from falls resulting from either intrinsic factors, such as exceeding their ability level, or extrinsic factors, such as swerving from or striking a motor vehicle or fixed object. Bicycle-related injuries among children younger than 21 years resulted in approximately 275 deaths[2] and an estimated 430 000 visits to emergency departments in 1998.[3] Among all recreational sports, bicycling injuries are the leading cause of emergency department visits for children and adolescents. Traumatic brain injury accounts for two thirds of all bicycle-related fatalities.[4] An estimated 23 000 children required emergency care after sustaining a traumatic brain injury while bicycling in 1998, accounting for about 5% of all bicycle-related injuries.[3]

Use of a bicycle helmet can prevent or lessen the severity of brain injury during a bicycle crash. Helmets work by absorbing some of the energy and dissipating the sharp energy peak of the blow over a larger area for a slightly longer time. A bicycle helmet typically consists of rigid crushable foam covered with a thin layer of plastic. It is held to the head by a retention system (chin strap) composed of flexible straps and hardware. The skull provides another layer of protection and absorbs additional energy. If forces are not extreme and the helmet is intact and worn correctly, the helmet-skull system should protect the brain from injury in most cases.

Correctly placing and securing a helmet on the head is important to maximize protection. Because 4 helmet sizes exist and models fit slightly differently, a child should try on several sizes and models to find the best fit when purchasing a helmet. Correct fit involves positioning the helmet on the head so it sits low on the forehead and is parallel to the ground when the head is held upright (the wearer should be able to see its lower brim when looking all the way up); installing or removing inside pads to make the helmet snug; and adjusting the chin strap so it is comfortably snug (ie, tight with room for only 2 fingers to be inserted between the strap and the chin). When in place with the chin strap secure, the helmet should not come off or shift over the eyes when the wearer tries to shake it loose.

Even when worn properly, a helmet does not offer an unlimited degree of protection, particularly against high-energy crashes. Even in low-impact falls, the helmet may be damaged by the force delivered, rendering it less effective in subsequent impacts. This damage may not be apparent to the eye. Accordingly, any helmet that has sustained a substantial blow should be discarded and replaced, including any helmet involved in a crash in which the head has hit a hard surface or in which a fall has resulted in marks on the shell. Furthermore, helmet integrity does not persist throughout time. Because some helmet materials deteriorate with age, the Snell Memorial Foundation, a nonprofit organization established to test and certify helmet safety, recommends that a helmet be replaced at least every 5 years, or sooner if the manufacturer recommends it.

Wearing a bicycle helmet is one of the most effective safety measures a child can take to prevent injury. The first study of helmet effectiveness indicated that it could prevent 88% of serious brain injuries.[5] In subsequent studies, helmets prevented 69% of head injuries[6] and 65% of injuries to the mid and upper face.[7] Despite the enormous degree of protection afforded by a bicycle helmet, a 1994 study indicated

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.

that only 25% of children 5 to 14 years of age usually or always wore a helmet while bicycling.[8] In 1999, the percentage of children who reported always using helmets varied among states from 13% to 65%.[9] Reasons usually given for not using a helmet are discomfort (especially heat), perceived lack of importance for casual riding (in contrast to sport or race bicycling), lack of style, or peer pressure.[8,10] Cost was seldom cited as an important factor now that helmets are widely available for less than $20.

Two factors are strongly associated with bicycle helmet use by young children—helmet use by an accompanying parent and a state mandatory helmet use law or local ordinance. In one study, a helmet was worn by 90% of children from a low-income neighborhood and 100% of children from a high-income neighborhood when an accompanying parent wore a helmet.[11] After enactment of a helmet law in Georgia, reported helmet use increased from 35% to 53%,[12] and in Oregon, enactment of a helmet law was associated with a doubling of observed helmet use to 49% among children and youth.[13] Presently, 17 states and the District of Columbia have age-specific bicycle helmet laws, usually covering bicyclists younger than 16 years. These laws affect 49% of all US children younger than 15 years. Another 2 states have recently enacted legislation. Such legislation has been shown to be more cost-effective than community-based or school-based interventions[14] and is a *Healthy People 2010* objective.[15]

Recently, a group of national experts from safety organizations and government agencies called for universal helmet use by all bicyclists, regardless of age. This goal has 3 strategies: 1) creating a national bicycle helmet safety campaign; 2) creating tools to promote helmet use; and 3) assisting states and communities wishing to address helmet use through legislation.[16]

Voluntary helmet safety standards have existed for many years, with the American National Standards Institute (ANSI), Snell Memorial Foundation, and American Society for Testing and Materials (ASTM) each establishing their own safety standards based on the ability of a helmet to manage the energy of a drop onto a metal anvil and the strength of the strap system. In 1999, the US Consumer Product Safety Commission (CPSC) issued a mandatory safety standard for bicycle helmets, requiring all helmets manufactured or imported for sale in the United States after March 1999 to comply with this standard.[17] Accordingly, parents should look for a sticker documenting CPSC approval on the inside liner of any new helmet purchased. Older helmets certified by the ASTM and/or the Snell Memorial Foundation may continue to be used, but helmets certified only by the ANSI should be discarded, because they were drop-tested from a height below the current 2 meter standard. Multisport helmets are designed for in-line skating, skateboarding, bicycling, and other sports. If a multisport helmet is intended or marketed (even by implication) to be used while bicycling, it must be certified to meet the CPSC standard for bicycle helmets.

RECOMMENDATIONS

Helmet Use

1. All bicyclists should wear properly fitted bicycle or multisport helmets each time they ride. A bicycle helmet or multisport helmet intended for bicycle use manufactured after March 1999 must have certification that it met the CPSC standard, regardless of whether it met the standards of any other organization. If a bicycle helmet manufactured before March 1999 meets the standards established by the Snell Memorial Foundation or ASTM (but not ANSI alone), it may be used. However, once damaged or outgrown, it should be replaced with a new helmet that has been certified to meet the CPSC standard.
2. Young children who ride as passengers must wear an appropriately sized helmet and be placed securely in a bicycle-mounted child seat or, preferably, a bicycle-towed child trailer. Children should never ride on the handlebars or crossbar.[18] Passengers should be at least 1 year old, by which age most children have sufficient muscle strength to control head movement during a sudden stop, even with the additional weight of a helmet.
3. Pediatricians should emphasize that any helmet involved in a crash or otherwise damaged should be discarded and replaced. Otherwise, all helmets should be replaced at least every 5 years, or sooner if the manufacturer recommends it. Purchase of helmets from yard sales should be discouraged, because the age and integrity of the helmet cannot be assured.
4. Parents and children should learn all essential aspects of bicycle safety. Helmet use is only 1 aspect of bicycle safety and does not substitute for the child's knowledge and practice of the rules of the road, sufficient visibility to drivers, and other safety measures.

Advocacy

1. Pediatricians should encourage parents and other child care providers to require children to wear a bicycle helmet when they begin riding tricycles or other wheeled vehicles or toys. Pediatricians should inform parents and patients of the importance of wearing a bicycle helmet and the dangers of riding without one. This information is especially important for adolescents, because they are particularly resistant to wearing a helmet.
2. Pediatricians should encourage parents to wear a helmet when bicycling to model safe behavior for their children.
3. Pediatricians should serve as community and legislative advocates to encourage state and local governments to enact legislation requiring helmet use by all bicyclists and mandating bicycle rental agencies to include helmets as part of the rental contract. The American Academy of Pediatrics has developed model state legislation titled "Child Bicycle Safety Act."[19]

4. Pediatricians should encourage school districts to make helmet wearing mandatory during bicycle rides to and from school and during school-related bicycle trips.
5. Coalitions of physicians, parents, and community leaders should develop and support community-based and school-based education programs to promote bicycle safety training that emphasizes helmet use. A national initiative to encourage all children to wear a helmet whenever bicycling deserves support.
6. Retail outlets are urged to carry affordable helmets and include them in the purchase of every new bicycle sold.
7. Organizations promoting helmet use are encouraged to provide attractive posters and educational videotapes for retailers and pediatricians to display as well as other materials for parent groups to distribute, emphasizing the safety advantages and attractiveness of protective headgear. All materials should teach how to wear a helmet correctly.
8. When bicyclists are shown in the popular media (including television, advertisements, movies, and promotional materials), those responsible are urged to consistently show them wearing a helmet.

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