

The Role of the Health Care Professional in Bicycle Safety

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ABSTRACT

Learning to ride a bicycle and enjoying the pleasures of cycling are synonymous with childhood; unfortunately, cycling does not come without risk of serious injury. Children under 15 years old account for the majority of cycling time in the United States, and on average, 1 child dies every day from a bicycle-related injury. Health care professionals can play an important role in making cycling a safe activity by encouraging and advocating for safe bicycling practices. Specific areas for physicians and health care professionals to emphasize involve the cyclist, environmental factors, and equipment factors. Helmet use by cyclists, avoidance of risk-taking, safe cycling road behavior, and proper cycling equipment fit and usage are all areas in which health care professionals can instruct families during office visits. The physician and the health care community can also be advocates for mandatory helmet legislation in order to achieve higher helmet usage rates and decreased cycling injuries. The health care professional's role in bicycle safety is an important component in building a foundation for safe cycling.

BACKGROUND

Bicycle riding is one of the most popular recreational

and transportation activities worldwide. A 1998 study found that there were an estimated 85.3 million bicycle riders in the United States. More than half of these cyclists were less than 21 years old, with children less than 15 years old accounting for 55% of total bicycle usage time.¹

Although biking is an enjoyable and environmentally sensitive mode of transportation and recreation, it is not without risk for injury. In 2001, 792 bicycle-associated deaths² and an estimated 519,424 emergency department (ED) visits occurred, approximately 60% of which involved children 16 years old and younger.³ The Centers for Disease Control and Prevention reports that, with the exception of the automobile, more childhood injuries are associated with bicycles than with any other consumer product. The annual US societal cost for the morbidity and mortality incurred from bicycle-related injury is estimated to be as high as \$8 billion dollars.⁴ Many of these injuries are preventable.

This article describes how physicians and other health care professionals can help decrease the number of bicycle-related injuries by examining intervention strategies directed at the cyclist, environmental factors, and equipment factors. A summary of the physician's role in promoting safe cycling is presented in Table 1.

THE CYCLIST

Use of Helmets

Head trauma is the leading cause of death and serious disability in bicycle-related injuries, accounting for 62% of all bicycle-related mortality.⁵ In addition to being the major cause of bicycle-related deaths, head injuries suffered while cycling are also responsible for 33% of all bicycle-related ED visits and 67% of bicycle-related hospital admissions.⁶ At least 40% of these deaths and 75% of the emergency department visits occur among children 14 years old and younger.⁷ Helmets are a major intervention to decrease bicycle-related head injury morbidity and mortality, and have been shown to be 69%-88% effective in preventing cycling-associated head injury.^{6,8-9} Despite the overwhelming evidence of the effectiveness

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Table 1. The Physician's Role in Promoting Safe Cycling

1. Educate parents and children about the importance of wearing a helmet.
2. Encourage parents to be a role model for their children and wear helmets.
3. Provide pamphlets detailing where helmets can be obtained.
4. Discuss safe cycling behaviors and avoidance of high-risk activities.
5. Advocate for passage of bicycle-helmet legislation in Wisconsin.
6. Advocate for environmental modifications that make areas more "bike-friendly."
7. Reinforce the message that safe cycling is fun cycling.

Table 2. Safe Cycling Practices

1. Understand and follow the rules of the road, especially stop signs.
2. Never ride into the street without stopping first – look left-right-left.
3. Ride with the flow of traffic.
4. When entering traffic or crossing a street, never blindly follow another cyclist; always look for yourself.
3. Ride during daylight hours (not after dark).
4. Wear bright-colored clothing and reflectors.
5. Do not attempt stunts or double ride with friends.
6. Never allow young children to ride unsupervised.
7. Always wear a helmet.

of bicycle helmets, fewer than 45% of all riders and only 31% of 11-19 year olds¹⁰ use them regularly.¹ When a cyclist uses a helmet, it is "passively" in place to mitigate potential causes of injury related to the cyclist's behavior, equipment, and riding environment; getting the cyclist to "actively" use the device, however, is often a challenge.

Health care professionals can help establish a culture where helmet use while cycling is the norm rather than the exception. Many parents are unaware of the importance of helmet use or the potential for serious injury associated with bicycle riding.¹¹ Educating families about the necessity for bicycle helmet use should be part of the regular health care visit, with special emphasis directed toward adolescents, those least likely to utilize helmets.¹ Parents should also be informed that they can influence a child's behavior by setting rules that require family members to wear helmets at all times¹² and by role modeling proper helmet use.¹³ In addition, helmet use should be encouraged in children as young as preschoolers.¹⁴ Not only does this use have injury prevention potential, but also can help establish a long-term helmet habit.¹⁴ To help overcome barriers to helmet use, primary care offices should also provide resource materials that contain information indicating where helmets can be acquired for

little or no cost. The National SAFE KIDS Campaign (800.289.0117, www.safekids.org) and coalitions provide regional information on the availability of low-cost helmets.

The most effective way to increase the use of helmets in a community is to combine educational campaigns with legislation that mandates helmet use while cycling. Legislative efforts clearly lead to the greatest increase in helmet use.¹⁵⁻¹⁷ A Canadian study comparing bicycle-related head injuries in children 5-19 years old who live in provinces that have bicycle helmet legislation, compared with provinces without legislation, showed that provinces with legislation in place have significantly fewer bicycle-related head injuries. Provinces with legislation experienced a 45% reduction in head injuries as compared with a reduction of only 27% in non-legislated provinces.¹⁸ Internationally, 5 countries have nationwide helmet legislation.¹⁹ In the United States, 20 states, the District of Columbia, and 145 local municipalities have laws requiring helmet use.¹⁹ Children who live in states that have helmet laws are more than 2.5 times as likely to wear helmets than children who live in states without helmet laws.²⁰ At the time of this writing Wisconsin has no statewide helmet law, and only 1 city, Port Washington, has enacted a local ordinance.¹⁹ Physicians working through professional organizations and grassroots campaigns can help the legislature introduce and pass a statewide bicycle helmet law that will result in increased helmet use and subsequent reduction in bicycle-related head injuries.^{15-18,20,21}

Behavior/Development

The manner in which cyclists ride their bicycles can contribute to increased injury occurrence. Fast speeds, stunt riding, cycling after dark, not obeying traffic rules, and riding against the flow of traffic can contribute to an increased risk in bicycle-related injuries.^{22,23} Males, with their suspected higher risk-taking behavior tendencies, are 3 times more likely to be injured while cycling than females. Boys, however, do have a higher bicycle usage rate than girls, which may help explain the gender disparity.¹ Table 2 summarizes safe cycling practices. Physicians can encourage safe cycling by discussing these points with families and by providing handouts that describe safe cycling behavior, such as "The Injury Prevention Program" (TIPP) safety sheets published by the American Academy of Pediatrics (AAP). It is especially important to target families with boys, given males' higher incidence of bicycle-related injuries. Young children's physical and mental developmental abilities also play a large role in how they operate bicycles. A child's ability to control a bicycle, understand

and follow the rules of the road, and demonstrate good judgment determine when a child is ready to ride without adult supervision. The AAP and the National SAFE KIDS Campaign suggest that parents not allow their children to ride in the street without supervision before they are 8-10 years old,^{24,25} and that children should not be riding bicycles outfitted solely with handbrakes until they are 9 years or older.

ENVIRONMENTAL FACTORS

Motor vehicles are involved in 90% of bicycle-related deaths and a high percentage of the serious injuries,⁷ with the majority of deaths occurring on major roads. Separating the cyclist from traffic, with environmental modifications such as bicycle lanes and paths, should help decrease the incidence of serious and fatal bicycle injuries. Further studies are needed however, to validate this “common sense” approach.

Injuries appear to occur in the environment where the rider spends the most time cycling. Adult injuries tend to occur at traffic intersections of major roads, and childhood injuries usually occur on minor roads within 1 mile of the child’s home. Children younger than 4 years are most commonly injured in areas around their house, such as the yard, driveway, and garage.^{24,26} Further research is needed to examine how cycling high-use areas can be made more bicycle use “friendly.” Until that information can be provided, passive safety devices, such as bicycle helmets, are the best way of reducing injury in all age groups. It is important for health care professionals to advocate for bicycle-safe environmental changes within their communities and to remind parents that the greatest percentage of bicycle injuries occurs in common-usage areas.

EQUIPMENT FACTORS

Bicycle

A bicycle must fit appropriately for an individual to have proper control while cycling; purchasing a bicycle for a child to “grow into” should be discouraged.²⁷ After a bicycle has been chosen, it should also be properly maintained to ensure safe function.

Helmets

Since March 1999, the US Consumer Product Safety Commission (CPSC) has issued mandatory safety standards for all helmets manufactured or imported for sale in the United States;²⁸ a CPSC approval sticker appears in all new helmets. It is important to realize that bicycle helmets are “single-impact” devices and need to be replaced after a crash or when they have identifiable damage such as dents, cracks, or compression of the liner.²⁹

Helmet fit is also important for proper function. As with the purchase of a bicycle, a helmet should not be selected for a child to “grow into.” The helmet should fit snugly and be adjusted to fit low on the forehead with the bottom helmet line parallel to the ground; chinstraps should be adjusted to a snug yet comfortable fit. In an effort to increase helmet use, children should be encouraged to select helmets that they find comfortable and appealing to wear.

Bicycle Carrier Seats and Trailers

Transporting small children in rear-mounted bicycle carriers and trailers is a popular way to take pre-cyclists on rides. However, bicycle seats place the child at an adult riding height and expose the child to adult-level forces if the bicycle should fall.³⁰ Falls account for 80% of injuries involving bicycle carrier seats, with head and face areas being affected in 72% of all injuries and 100% of all serious injuries.³⁰ A child’s feet becoming entangled in the spokes while riding in a seat carrier is another common form of injury.³¹ Carrier seats tend to make bicycles less stable and increase braking distance; therefore, parents must exercise increased caution while transporting a child in this fashion. Only children who can sit unsupported and whose necks are strong enough to support a lightweight helmet should be allowed to ride in a seat carrier (1-4 years old). Rear-mounted seats should be attached securely and have spoke guards and/or foot wells, a high back, sturdy harness, and lap belt to secure the child in place.³² No children older than 4 years should be allowed on rear mounted seat carriers; the weight of older children renders the bicycle less stable and difficult to handle.³²

A bicycle trailer is also a popular mode for transporting small children. Trailers are close to the ground and do not make the bicycle as unstable as rear-mounted carriers.^{29,31} Being close to the ground, however, makes trailers difficult for motorists to see while in traffic, and it is recommended that bicycle trailers not be used on roadways.²⁹ As noted with seat carriers, the head is the most frequently involved site with trailer-associated crashes.³¹ The importance of wearing a helmet for children using both of these devices cannot be overstated.

SUMMARY

Bicycling remains a popular means of transportation, exercise, and recreation for people of all ages. Cycling, however, does not come without risk of injury. Knowledge of cycling risks, combined with safe cycling practices, can prevent many deaths and injuries. Physicians and other health care providers can serve their patients well by highlighting risks associated with

cycling and educating families about injury prevention. At present, a cyclist's most important safety intervention is the act of wearing a helmet, and this should be encouraged at all times. Physicians also have the opportunity and responsibility to advocate for legislation that mandates the use of helmets while cycling. Promoting bicycle safety is a shared responsibility of the individual, parents, the community, and government. The benefits of these combined efforts can save lives, millions of health care dollars, and a family's quality of life.

ACKNOWLEDGMENTS

The authors thank Lori L. Bakken, PhD, for her editorial comments regarding this manuscript; her contribution is greatly appreciated.

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The *Wisconsin Medical Journal* (ISSN 1098-1861) is the official publication of the Wisconsin Medical Society and is devoted to the interests of the medical profession and health care in Wisconsin. The managing editor is responsible for overseeing the production, business operation and contents of the *Wisconsin Medical Journal*. The editorial board, chaired by the medical editor, solicits and peer reviews all scientific articles; it does not screen public health, socioeconomic or organizational articles. Although letters to the editor are reviewed by the medical editor, all signed expressions of opinion belong to the author(s) for which neither the *Wisconsin Medical Journal* nor the Society take responsibility. The *Wisconsin Medical Journal* is indexed in Index Medicus, Hospital Literature Index and Cambridge Scientific Abstracts.

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