

Give Wisconsin Children a Boost

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ABSTRACT

In the United States, more children die from motor vehicle crashes than any other cause. Research has demonstrated that children ages 4-8 have a significantly reduced risk of injury if they are restrained in booster seats rather than adult seatbelts. Despite current recommendations, few children in this age group are properly restrained. Health care providers can help increase booster seat use by educating parents, participating in community campaigns, and advocating for mandatory booster seat laws.

INTRODUCTION

Motor vehicle crashes are the leading cause of death in children over the age of 1 in the United States.¹ Frequently overlooked is the 4- to 8-year-old child, who has outgrown his child safety seat with harness but is not yet big enough for an adult seat belt. In the United States in 2002, more than 400 children between the ages of 4 and 8 were killed in motor vehicle crashes, and another 71,000 were injured.² Of children in this age group, it is estimated that 68% of them are not using a child restraint system.³ Even those who are using a booster seat are using it incorrectly over 40% of the time. This leaves a large majority of our early school age children in unnecessary danger.

Children in Wisconsin suffer significant morbidity and mortality in motor vehicle crashes (Table 1). Between 1998 and 2002, 36 children 4-8 years old died in motor vehicle crashes and another 204 were hospitalized. In considering the use of child passenger seats

in these crashes, only 36% of 4-year-old children in Wisconsin were in child safety seats. Even more disturbing is the fact that only 7.5% of 5-9 year olds were using booster seats.⁴

INJURIES

Safety belts are designed for adults. They do not fit children properly until they are 4 ft 9 in, which is usually around age 8 or 9. When children are smaller than this, the seat belt sits across their abdomen and their neck, setting them up for injury. (Figure 1.)

The pattern of injuries sustained by a child not yet large enough for a seat belt has become known as "Seat Belt Syndrome."⁵ Seat Belt Syndrome includes intra-abdominal, lumbar spine, and head injuries. The abdominal injuries are often bowel contusion or perforation. The proposed mechanism for intestinal injury is a combination of the child's immature pelvis anchoring the lap belt and their tendency to scoot forward in the seat so that their knees bend at the edge. During a rapid deceleration, the abdominal contents become crushed between the lap belt and the lower spine, causing injury such as small bowel mesenteric tears and perforation. This rapid deceleration across the belt also places large flexion forces on the spine, causing fractures. Compression fractures and Chance fractures are 2 lumbar spine injuries that have been described as part of seat belt syndrome. A Chance fracture occurs when large flexion forces on the spine cause rupture of the posterior ligament and fractures of the spinous process, pedicles, and vertebral body (See Figure 2).⁶

The head injuries sustained by children in motor vehicle crashes are often concussions, skull fractures, or more serious brain injuries. The discomfort of the shoulder belt across the child's neck causes many children to place the shoulder belt behind their torso. This allows their upper body to fly freely in a crash, causing the child's head to collide with structures in the interior of the car.

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Table 1. Wisconsin Childhood Motor Vehicle Crash Deaths and Hospitalizations, 1998-2002, By Gender⁷

	Newborn to 3 Years		4 to 8 Years		9 to 15 Years		16 to 18 Years	
	D*	H*	D*	H*	D*	H*	D*	H*
Male	12	57	25	104	51	251	194	345
Female	9	48	11	100	43	254	117	338
Totals	21	105	36	204	94	505	311	683

E codes: 810.1, 811.1, 812.1, 813.1, 815.1, 816.1

*D=Deaths; H=Hospitalizations

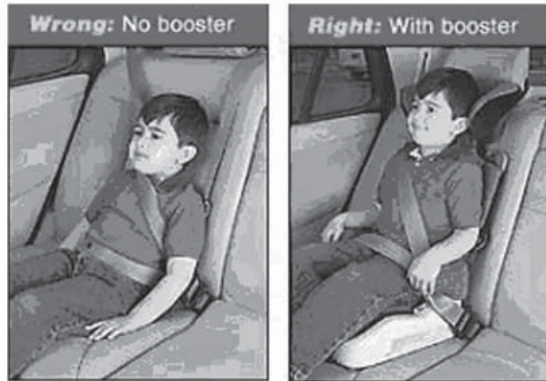


Figure 1. Child Safety Seats ©2001 by Consumers Union of US, Inc. Yonkers, NY 10703-1057, a nonprofit organization. Reprinted with permission from the July 2001 issue of *Consumer Reports*® for educational purposes only. No commercial use or reproduction permitted. www.consumerreports.org.

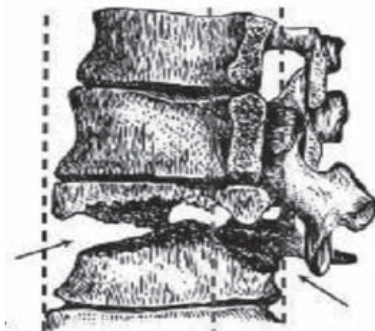


Figure 2. Drawing of a Chance fracture of the thoracolumbar junction, used with permission from eMedicine.com, Inc., 2004.

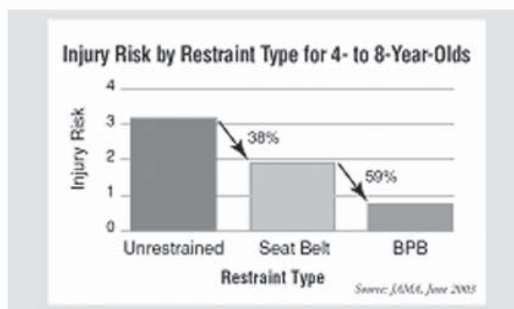


Figure 3. Image reproduced with permission from Child Passenger Safety Issue report.²

BOOSTER SEATS

A belt positioning booster seat places the belt appropriately across a child's hips and shoulder, reducing his risk of injury by 59% when compared to seat belts alone (Figure 3).⁸ Durbin et al showed a reduction in all types of injury with booster seat use, although reduction in the incidence of abdominal injuries was most convincing.

Despite the fact that the evidence clearly shows the benefits of booster seats, their use remains low. Current medical literature estimates that 10%-20% of children age 4-8 are properly restrained.^{8,9} The numbers are even lower for minority children and children of low-income families.^{10,11} Durbin et al showed that booster seat use decreases as children get older. While 16% of 4-year-old children may be riding in a booster seat, only 4% of those ages 6 or 7 are using them.⁸ The barriers to booster seat use are numerous. One common barrier is parental misconception that their children are safe in seat belts alone.¹² Cost is also a frequently cited reason why parents do not purchase booster seats.^{11,13,14} However, hospitals and advocacy groups, such as SAFE KIDS Coalition, will often sell them to families at a reduced cost. Another barrier to booster seat use is that many children feel they are too big for a "baby seat" and will resist using a booster seat. Parents should involve their child in the process of installing the booster seat and buckling the child in. In reality, a booster seat can make a car ride more comfortable because the seat belt will fit better and the child will have a better view out of the window. When parents are consistent in their message that using a child safety seat is not optional, their children are more likely to comply. Compliance is easier in states that have a mandatory booster seat law, because parents have the law to support their rules; a lack of legislation is a major barrier to booster seat use.

CURRENT LAWS AND RECOMMENDATIONS

Parents look to state laws for guidance about what type of restraint would be most appropriate for

Table 2. National Highway Traffic Safety Administration's Child Safety Seat Recommendations

Age /Weight	Seat Type /Seat Position	Usage Tips
Infants		
Birth to at least 1 year/at least 20 lbs.	Infant-Only Seat/rear-facing or Convertible Seat/used rear-facing. Seats should be secured to the vehicle by the seat belts or by the LATCH system.	<ul style="list-style-type: none"> • Never use in a front seat where an air bag is present. • Tightly install child seat in rear seat, facing the rear. • Child seat should recline at approximately a 45 degree angle. • Harness straps/slots at or below shoulder level (lower set of slots for most convertible child safety seats). • Harness straps snug on child; harness clip at armpit level.
Less than 1 year/20-35 lbs.	Convertible Seat/used rear-facing (select onerecommended for heavier infants). Seats should be secured to the vehicle by the seat belts or by the LATCH system.	<ul style="list-style-type: none"> • Never use in a front seat where an air bag is present. • Tightly install child seat in rear seat, facing the rear. • Child seat should recline at approximately a 45 degree angle. • Harness straps/slots at or below shoulder level (lower set of slots for most convertible child safety seats). • Harness straps snug on child; harness clip at armpit level.
Preschoolers /Toddler		
1 to 4 years/at least 20 lbs. to approximately 40 lbs.	Convertible Seat/forward-facing or Forward-Facing Only or High Back Booster/Harness. Seats should be secured to the vehicle by the seat belts or by the LATCH system.	<ul style="list-style-type: none"> • Tightly install child seat in rear seat, facing forward. • Harness straps/slots at or above child's shoulders (usually top set of slots for convertible child safety seats). • Harness straps snug on child; harness clip at armpit level.
Young Children		
4 to at least 8 years/unless they are 4'9" (57") tall.	Belt-Positioning Booster (no back, base only) or High Back Belt-Positioning Booster. NEVER use with lap-only belts—belt-positioning boosters are always used with lap AND shoulder belts.	<ul style="list-style-type: none"> • Booster base used with adult lap and shoulder belt in rear seat. • Shoulder belt should rest snugly across chest, rests on shoulder; and should NEVER be placed under the arm or behind the back. • Lap-belt should rest low, across the lap/ upper thigh area—not across the stomach.

Source: www.nhtsa.dot.gov/CPS/

their 4-8 year old. Approximately half of the states, including Wisconsin, require safety seats only to age 4.¹ This gives parents a false sense of security that seat belts alone are sufficient to protect their 4-8 year old. Advocates have long recommended belt positioning booster seats for this age group. The National Highway Transportation and Safety Administration's guidelines state that children 4-8 years old should be in a belt positioning booster seat in the back seat of the vehicle unless they are 4 ft 9 in tall (Table 2).

THE ROLE OF THE MEDICAL COMMUNITY

The education of parents and children provides an important opportunity to not only raise awareness about booster seat use, but also to spark interest. A controlled trial of a community-based educational intervention done by Ebel et al in Washington and Oregon found positive results.¹⁵ After 15 months of their campaign, booster seat use in intervention communities increased significantly from 13.3% to 26.1% compared to an increase of 17.3% to 20.2% in control communities ($P=0.008$). To spread the message about the importance

Table 3. Web Sites with Booster Seat Information

www.chop.edu/carseat
 www.safekids.org
 www.nhtsa.gov/CPS/
 www.carseat.org
 www.aap.org/family/carseatguide.htm
 www.saferidenews.com

Accessed on December 29, 2004.

of booster seat use, the campaign used public service announcements on the radio and television, a Web site, a booster seat telephone hotline, and newspaper and local news stories. The target audience included parents and health and child care providers.

In Wisconsin, a booster seat campaign looked at booster seat use in Madison Head Start children and attempted to increase use with a combined educational presentation and booster seat giveaway.¹⁶ Before the giveaway, only 6% of children used booster seats; after the giveaway, this number increased to 34% ($P < 0.001$). Although significant increases were seen with both educational and giveaway approaches, overall booster seat use remained quite low. It seems likely that the most significant gains will be achieved when these methods are combined with legislation.

Physicians can help increase booster seat use using 3 main tactics. First, they have an opportunity to educate their patients about the importance of booster seats. An educational handout created by the Partners for Child Passenger Safety can aid physicians with this patient education (See Figure 4). There are also many informational Web sites for use by physicians or their patients (See Table 3). For parents who are unsure if they installed their safety seat correctly, SAFE KIDS Coalition offers toll free advice at 800.441.1888. Second, physicians can organize or participate in community campaigns based at daycare centers, schools, and youth-serving organizations such as the YMCA or family resource centers. Finally, it is also the role of physicians to advocate for a mandatory booster seat law in states that lack this legislation, such as Wisconsin. Utilizing connections with schools, hospitals, and state representatives, physicians are in a key position to advocate for legislative change, thereby increasing booster seat use.

ACKNOWLEDGMENTS

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FOR YOUR family

Belt-positioning Booster Seats: *Easy to Use, Affordable and Safe*

When your child reaches the top weight or height for his child safety seat, his shoulders are above the harness slots or his ears have reached the top of his child safety seat, he needs a booster seat. A booster seat raises your child up so that the vehicle's lap/shoulder belt fits him correctly.

How do you use a booster seat?

- Read the booster seat and vehicle user manuals.
- Place the booster seat in the back seat in a position with a lap/shoulder belt. Never use a booster seat if there is only a lap belt.
- After your child sits in the booster, pull the lap/shoulder belt across him and buckle the seat belt.
- Check to see if the belt crosses the shoulder between the neck and arm and that the lap belt is low and snug on the hips, just touching the thighs.



What type of booster is best?

- Use a backless booster seat if the back seat of your car has head rests or a high seat back. Otherwise, choose a high-back booster seat.
- Prices start at \$20 for a backless booster. More expensive seats are not necessarily safer.

How effective are boosters? Why aren't seat belts good enough?

- Belt-positioning boosters are safest for your school-age child in a crash. Any restraint is better than no restraint, but boosters are 60 percent safer than seat belts alone. In a crash, poor-fitting seat belts can result in serious injury to a child's abdomen, neck and head.
- Seat belts are made to fit adults. Until your child is big enough, he needs a boost.

What to do if your child says, "But I'm a big kid now!"

- Tell your child that the car will not move until everybody is buckled up correctly.
- Let your child select his booster seat, and teach him how to buckle himself up.
- Show your child that the booster will let him see out the window better and help make the seat belt comfortable.
- Tell your child that boosters are for "big kids." Don't call a booster seat a child's seat.



When is it safe to move my child from his booster seat to an adult seat belt?

Your child should stay in a booster seat until the adult seat belt fits — usually when he is about 4'9" in height and is 8 to 12 years old. The seat belt fits properly when:

- The shoulder belt lies across the chest, not the neck or face.
- The lap belt is low and snug across the thighs, not across the stomach; and
- The child is tall enough to sit against the vehicle seat back with his legs bent at the knees and feet hanging down.

The information contained in this publication should not be used as a substitute for the medical care and advice of your pediatrician. There may be variations in treatment that your pediatrician may recommend based on individual facts and circumstances.

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Child Passenger Safety
State Farm Insurance Companies
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Neighbors working together



For more information visit www.chop.edu/carseat

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Figure 4. Parent handout from the Partners for Child Passenger Safety.² Permission granted for use.

Wisconsin Medical Journal

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