Child Passenger Safety

Motor vehicle injuries are the leading cause of death among children in the U.S. (CDC 2006). But many of these deaths can be prevented. Placing children in age- and size-appropriate restraint systems reduces serious and fatal injuries by more than half (NHTSA 2006d).

Occurrence and Consequences

- In the United States during 2005, 1,451 children ages 14 years and younger died as occupants in motor vehicle crashes, and approximately 203,000 were injured. That's an average of 4 deaths and 556 injuries each day (NHTSA 2006b).

- Of the children ages 0 to 14 years who were killed in motor vehicle crashes during 2005, nearly half were unrestrained (NHTSA 2006b).

Risk Factors

- One out of four of all occupant deaths among children ages 0 to 14 years involve a drinking driver. More than two-thirds of these fatally injured children were riding with a drinking driver (Shults 2004).

- Restraint use among young children often depends upon the driver's restraint use. Almost 40% of children riding with unbelted drivers were themselves unrestrained (Cody et al. 2002).

- Child restraint systems are often used incorrectly. One study found that 72% of nearly 3,500 observed child restraint systems were misused in a way that could be expected to increase a child's risk of injury during a crash (NHTSA 2006c).

Prevention

- Child safety seats reduce the risk of death in passenger cars by 71% for infants, and by 54% for toddlers ages 1 to 4 years (NHTSA 2006b).

- The National Highway Traffic Safety Administration recommends booster seats for children until they are at least 8 years of age or 4'9" tall (NHTSA 2006d).

- For children 4 to 7 years, booster seats reduce injury risk by 59% compared to safety belts alone (Durbin et al. 2003).

- All children ages 12 years and younger should ride in the back seat. This eliminates the injury risk of deployed front passenger-side airbags and places children in the safest part of the vehicle in the event of a crash. Overall, for children less than 16 years, riding in the back seat is associated with a 40% reduction in the risk of serious injury. Appropriately restrained children ages 13 to 15

who sit in the front seat are not at increased risk for injury (Durbin et al. 2005). To learn more about effective interventions to increase child safety seat use, visit CDC's Motor Vehicle Occupant Safety page.

CDC Research and Program Activities

Evaluating community-based interventions
CDC is funding two state health departments to evaluate community-based interventions that were selected from the *Guide to Community Preventive Services*. Both the Michigan Department of Community Health and the Colorado Department of Public Health & Environment are implementing and evaluating interventions aimed at increasing booster seat use among children 4 to 8 years of age. Colorado is also working to increase safety belt use in rural counties through enhanced enforcement campaigns.

For more information about these programs, contact:

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A Boost for Children Ages 4 to 8

NCIPC funded state health departments in Colorado, Kentucky, and New York to develop, implement, and evaluate community-based programs to increase booster seat use among children ages 4 to 8. From 2000 through 2003, grantees implemented and evaluated community awareness campaigns and school-based programs, aired public service announcements, posted billboards, and conducted booster seat distribution events and car seat checkpoints. Evaluation data from Colorado showed a significant increase in booster seat use in target communities when compared with control communities. Evaluation activities continue in New York and Kentucky. Results from these intervention evaluations will help guide future efforts to increase booster seat use.

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Identifying risk factors and examining outcomes for older children involved in motor vehicle crashes

CDC's Injury Center is funding the Children's Hospital of Philadelphia to examine risk factors and outcomes for children ages 8-15 years who were involved in motor vehicle crashes. Researchers are interviewing parents to learn about their typical use of child restraints and the particular restraint in use at the time of the crash. Interview questions also assess the parent's understanding of child restraint laws in their state and explore how the motor vehicle crash has affected the child's daily life. This information will be considered with data about the types of injuries sustained in the crash, the child's position in the car, and demographic characteristics of the child and driver. This research is part of an ongoing surveillance system that is a collaborative effort between researchers at the Children's Hospital of Philadelphia and State Farm Insurance. The study will shed light on the impact of motor vehicle crashes on children's daily lives. Results will be used to improve prevention strategies.

Learning to Effectively Increase Booster Seat Use

CDC funded two new investigators and an injury research center to evaluate interventions aimed at increasing booster seat use. Results will be used to inform intervention design for community-based and state-wide programs.

- Researchers at Indiana University evaluated the effectiveness of two interventions designed to increase booster seat use among children ages 4 to 6 years. Parents and children in the first intervention group received education and an incentive, while those in the second group received education and a free booster seat. Both were contrasted with a control group.

- In addition to evaluating an ongoing community-based intervention, investigators at the University of Washington conducted research to better understand the barriers to booster seat use, and parent and child behavioral factors that influence consistent use. A web-based counseling tool for child passenger safety was pilot tested.

- The Injury Prevention Center of Greater Dallas evaluated a community-based intervention to increase child safety seat and booster seat use in a low-income, primarily Hispanic and African-

American population. Use in intervention communities that received education and child safety or booster seats was compared with similar communities and the city of Dallas.

Impaired Driving and Child Passengers

In 2005, 16,885 people died in alcohol-related motor vehicle crashes, accounting for 39% of all traffic-related deaths in the United States (NHTSA 2006a). A CDC study showed that more than two-thirds of children ages 14 years and younger killed in alcohol-related crashes were riding with the drinking driver (Shults 2004).

Related article:

Shults RA. Child passenger deaths involving drinking drivers—United States, 1997–2002. [published erratum appears in MMWR 2004;53(5):109]. MMWR 2004;53(4):77–9.

Best Practices
CDC and the Task Force on Community Preventive Services conducted systematic reviews on interventions to increase the use of child safety seats, increase seat belt use, and reduce alcohol-impaired driving. Recommendations are available for each of the intervention types.

Related articles:

Zaza S, Sleet DA, Shults RA, Elder RW, Dinh-Zarr T, Nichols JL, Thompson RS, Task Force on Community Preventive Services. Motor vehicle occupant injury. In: Zaza S, Briss PA, Harris KW (eds.) The guide to community preventive services: What works to promote health? New York: Oxford University Press; 2005. p. 329-84.

Dellinger A, Sleet DA, Shults R, Rinehart C. Interventions to Prevent Motor Vehicle Injuries. In: Doll L, Bonzo, S, Mercy, J, Sleet, D (Eds). Handbook of Injury and Violence Prevention. New York: Springer; 2007. p.55-79.

Airbags and Children

The force of a deployed airbag can injure or kill a young child even in a slow-speed, otherwise survivable crash. Children ages 12 years and younger, including infants, should never be placed in a seat in front of an airbag. Riding in the back eliminates children's risk of such injury. For more information, three CDC publications are provided below:

- In November 1997, CDC published a notice in MMWR announcing the U.S. Department of Transportation's decision to allow vehicle owners meeting certain qualifying criteria to install air bag on-off switches in their vehicles. Details of the ruling and CDC commentary can be found online: MMWR 1997; 46 (46): 1098-9.

- CDC first published a warning on the interaction between airbags and rear facing car seats in 1993: MMWR 1993;42(No.14):20-2.

- CDC published an update, two years later, that included several case reports of children killed in this front-passenger position when an air bag deployed: MMWR 1995;44(45):845-7.

Kids in the Back/Niños Atrás

CDC's Injury Center funded the Center for Risk Analysis at the Harvard School of Public Health to develop, implement, and evaluate the Kids in the Back/Niños Atrás program in a low-income Hispanic community. This three-year, community-based intervention was designed to increase the number of children 12 and younger who ride properly restrained in the back seat of motor vehicles, the safest place for them. Project investigators organized a community task force; developed educational materials in English and Spanish for parents and children; implemented an incentive program to further motivate parents and children to adopt this behavior; coordinated 25 community events and safety seat checkpoints and a public information campaign targeting parents and caregivers of children. Researchers conducted pre- and post-intervention observational surveys of restraint use and seating position among children ages 12 years and younger in the intervention and two control communities. During the period of study, the percentage of children in the intervention community who were observed riding in the back seat increased from 33% to 49%.

Related articles:

Greenberg-Seth J, Hemenway D, Gallagher SS, Ross JB, Lissy KS. Evaluation of a community-based intervention to promote rear seating for children. American Journal of Public Health 2004;94(6):1009-13. Available from URL www.ajph.org/cgi/content/abstract/94/6/1009.

Greenberg-Seth J, Hemenway D, Gallagher SS, Lissy KS, Ross JB. Factors associated with rear seating of children in motor vehicles: a study in two low-income, predominantly Hispanic communities. Accident Analysis & Prevention 2004;36(4):621-26.

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Department of Transportation (US), National Highway Traffic Safety Administration (NHTSA). Traffic safety facts 2005: alcohol. Washington (DC): NHTSA; 2006a [cited 2006 Oct 3]. Available from URL: http://www-nrd.nhtsa.dot.gov/pdf/nrd-30/NCSA/TSF2005/AlcoholTSF05.pdf.

Department of Transportation (US), National Highway Traffic Safety Administration (NHTSA), Traffic Safety Facts 2005: Children. Washington (DC): NHTSA; 2006b. Available from URL: http://www-nrd.nhtsa.dot.gov/pdf/nrd-30/NCSA/TSF2005/ChildrenTSF05.pdf. [cited 2006 Dec 7].

Department of Transportation (US), National Highway Traffic Safety Administration (NHTSA), Traffic Safety Facts Research Note 2005: Misuse of Child Restraints: Results of a Workshop to Review Field Data Results. Washington (DC): NHTSA; 2006c. Available from URL:
http://www.nhtsa.dot.gov/people/injury/research/TSF_MisuseChildRetraints/images/809851.pdf. [cited 2007 Jan 19]

Department of Transportation (US), National Highway Traffic Safety Administration (NHTSA). BoosterSeat.gov. Washington (DC): NHTSA; 2006d. Available from URL: www.boosterseat.gov. [cited 2006 Dec 7]

Durbin DR, Chen I, Smith R, Elliott MR, Winston FK. Effects of seating position and appropriate restraint use on the risk of injury to children in motor vehicle crashes. Pediatrics 2005;115:305-9.

Durbin DR, Elliott MR, Winston FK. Belt-positioning booster seats and reduction in risk of injury among children in vehicle crashes. JAMA 2003;289(14):2835–40.

Shults RA. Child passenger deaths involving drinking drivers—United States, 1997−2002 [published erratum appears in MMWR 2004;53(5):109]. MMWR 2004;53(4):77–9.