

## OREGON PUBLIC HEALTH DIVISION • DEPARTMENT OF HUMAN SERVICES

### REAR FACING CAR SEATS— SAFEST FOR INFANTS AND TODDLERS

While airlines explore how to hurdle our psychological barrier to flying seated facing backwards, there is a preponderance of evidence proving that it is far safer for young children under the age of four to ride in a rear-facing child safety seat.<sup>1</sup> Children under age two are 75% less likely to be killed or severely injured in a motor vehicle crash if they are riding rear facing rather than forward facing. And seats facing the rear are five times safer.<sup>2</sup> This issue of the *CD Summary* presents Oregon specific data on motor vehicle traffic injury and death for our smallest passengers, reviews analysis of injuries due to crash forces, and provides recommendations for health care providers about this hazard.

#### OREGON DATA

Motor vehicle crashes remain the leading cause of death among Oregon children. Between 2002–2006, Oregon's average annual rate of death due to motor vehicle crashes for children 0 – 2 years of age was 3.7 deaths per 100,000. The US crude rate of death for 2006 was 3.0 deaths per 100,000. In 2007, Oregon Department of Transportation data show that 339 children ages 0 – 3 were injured in a car crash; all should have been riding in a child restraint. However, according to police reports, 5 weren't restrained at all, and 26 were restrained with just a seat belt. The risk of injury or death greatly increases in a motor vehicle crash if children are not appropriately restrained.

#### CRASH DYNAMICS RESEARCH

An analysis of US National Highway Traffic Safety Administration data of 870 children involved in crashes from 1998 – 2003 found that through 23 months of age, rear-facing seats provide better protection from all crash types. Rear-facing seats provide better protection of the lower

neck and chest because they support full alignment of the head, neck, and spine, so that crash forces are dispersed over these areas rather than centered on one site.<sup>1</sup>

Why? The forces for a forward-facing child in a frontal crash differ quite significantly to that of a rear-facing child. The head on a child constitutes approximately 25 percent of the child's weight. When a forward-facing child is thrust forward in a crash, the torso is restrained by the harness straps; however, the weight of the unrestrained head snapped forward can stretch the spinal cord. The immature cervical vertebrae in a child less than 3 years of age can't protect the spinal cord because they are still in pieces joined by cartilage. These pieces are soft and will not ossify into a complete circle of bone that will enclose and protect the spinal cord until ages 3 – 6 years old. The spinal cord ruptures at ¼ inch. A young child's skull can be literally ripped from the spine by the force of a crash.<sup>3</sup> If the spinal cord stretches too far in an accident this can cause it to tear, resulting in paralysis or death. This is often described as internal decapitation.

Other body parts of small children are fragile including flexible neck muscles, loose ligaments to allow for growth, small rib cages, undeveloped abdominal muscles, and unprotected relatively larger abdominal organs.

The rear-facing child has the frontal crash forces spread over their back, head and neck (a large portion of the body) that is supported by the back of the car seat. In a rear-facing seat, the child's head, neck and spine all remain aligned along the entire shell of the seat, enabling "ride down" of the crash forces, and reducing forward and backward snapping of the head that stretch the spinal cord.

Rear-facing child restraints also offer significant safety advantages in side and frontal offset impacts. When rear-facing in a side-on or frontal offset impact, the head of the child is better kept within the confines of the seat and can reap the benefits of the restraints side wings for protection. In 2008, research from Partners for Child Passenger Safety note that for children in crashes, frontal impact crashes are the most common at 40.2 percent, and side-impact accounted for 27 percent.<sup>4</sup>



#### OREGON LAW AND PRACTICE RECOMMENDATIONS

In Sweden and Europe where regulation has kept pace with research, children up to age four have been riding in rear facing seats for years. The good news is that the American Academy of Pediatrics made a step forward recently to revise their recommendations.

In an accommodation to car seat manufacturers, the new recommendations are directed at the car seat (not the child) – so they don't exactly call for healthcare providers to counsel parents to place children in rear facing seats up to the age of four. Rather, they recommend that children ride in rear-facing child safety seats to the highest weight allowed by the car seat manufacturer.<sup>5</sup>



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Market forces are a barrier. While European countries market rear-facing child safety seats to fit children under age four, parents in the United States will have to shop a bit harder to find an infant seat with a higher rear-facing limit than 22 pounds. In the US, higher rear-facing limits may be easier to find among convertible safety seats (seats which can be used either rear or forward facing) since most seats of this type commonly have rear facing weight limits of 30 pounds or more. Rear-facing seats with these higher weight limits provide better protection for many children beyond their first birthdays.

Finally, community norms are a big obstacle. Many parents regard turning their infant to forward facing at age one to be a “right of passage.” Parents also believe that when their rear-facing child’s legs touch the back of the motor vehicle seat, it is uncomfortable for the child or could cause serious injury to the legs in a crash – research shows that lower extremity injuries are rare for children facing the rear (1 per 1,000 children).<sup>2</sup>

#### GET THE MESSAGE OUT

Safe Kids coalitions and partners throughout Oregon will observe National Child Passenger Safety Week September 12 – 18, by promoting “appropriate” restraint use, highlighting the latest recommendations for extended use of rear-facing seats for children ages 1 – 2, and promoting the benefits of using booster seats for children weighing greater than 40

pounds, up to age 8 and a height of 4’9”. The week kicks off with “Seat Check Saturday” and special week-long activities will include enhanced law enforcement, free child seat check up events, and media outreach.

#### PHYSICIANS AND HEALTHCARE PROVIDERS

Physicians should counsel parents and caregivers that for best protection, a child should ride in a rear-facing seat to the highest weight or maximum height (which ever comes first) indicated by the car seat manufacturer. They should also advise parents to shop for a seat with an upper weight minimum of 30 or more pounds rear facing. You can help by:

- Directing parents and caregivers to free car seat check up events.
- Mentioning the new recommendations in patient newsletters, websites, and letters to the editor.
- Displaying new research and materials in waiting rooms or patient areas.
- Work with advocates to update Oregon law.

#### RESOURCES FOR ACTION

- A list of higher weight limit seats can be found at [www.car-safety.org/rear-face.html](http://www.car-safety.org/rear-face.html).
- Find free car seat check up events throughout the state by downloading a Calendar of Check-Up Events at [www.childsafetyseat.org/calendar.html](http://www.childsafetyseat.org/calendar.html).
- As part of National Child Passenger Safety Week, a special packet of free materials for physicians can be ordered at [www.actsoregon.org/store.html](http://www.actsoregon.org/store.html).

- Video demonstrations and the latest research on the benefits of rear-facing seats can be found at: [www.cpsafety.com/articles/stayrear-facing.aspx](http://www.cpsafety.com/articles/stayrear-facing.aspx).

For technical questions on child passenger safety in Oregon, contact the following statewide programs:

- ACTS Oregon/Child Safety Seat Resource Center, 800-772-1315, or in the Portland Metro area, 503-643-5620; [www.actsoregon.org](http://www.actsoregon.org).
- ODOT Transportation Safety Division, Occupant Protection Program, 503-986-4199; [www.oregon.gov/ODOT/Ts/safetybelts.shtml](http://www.oregon.gov/ODOT/Ts/safetybelts.shtml).
- Safe Kids Oregon, 971-673-1001; [www.oregon.gov/DHS/ph/safekids/index.shtml](http://www.oregon.gov/DHS/ph/safekids/index.shtml).

#### REFERENCES

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3. Child Safety Seat Technical Encyclopedia on the web at: [www.carseat.org/Technical/tech\\_update.htm#rearfacFE](http://www.carseat.org/Technical/tech_update.htm#rearfacFE).
4. Partners for Child Passenger Safety, Fact and Trend Report, September 2008. The Children’s Hospital of Philadelphia, 2008.
5. American Academy of Pediatrics, Committee on Injury and Poison Prevention. Selecting and using the most appropriate car safety seats for growing children: Guidelines for counseling parents. *Pediatrics* 2002;109:550–553.

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