February 11, 2017

OREGON HEALTH &SCIENCE UNIVERSITY

To: House Committee on Early Childhood and Family Supports
2017 Oregon Legislature

Dear Mr. Chairman and Members of the Committee:

I am thrilled to be here today to testify on behalf of HB 3404 which will prevent injuries and death to vulnerable children by requiring all children to be transported in rear facing car safety seats until they reach the age of 2 years.

I am a pediatrician at OHSU, and the Medical Director of the Tom Sargent Safety Center at Doernbecher Children's Hospital. I have been a certified Child Passenger Safety Technician since 1997, and am the only practicing physician certified as a Child Passenger Safety Technician Instructor in the country. I have personally helped over 10,000 families learn how install and use their car safety seats correctly, and I am the Chair-elect of the American Academy of Pediatrics Council on Injury Violence and Poison Prevention Executive Committee, where I was a co-author of the 2011 policy statement on Child Passenger Safety.

Car crashes remain the leading cause of death for children ages 1-14 years, accounting for the death approximately 5 children per day in our country. Over 350 children are seriously injured in crashes every single day. Car safety seats are very effective and can decrease the risk of and the risk of death and serious injury by up to 71% for children under 4 years old.

There are 4 stages of safe motor vehicle transport for children: rear facing car safety seats, forward facing car safety seats. Belt positioning booster seats, and seat belts. Current Oregon law requires children to ride rear facing until the age of 1 year, allowing them to turn forward facing on their birthday. However, a study published in 2007 showed that children between 1 and 2 years old were 5.32 times less likely to be seriously injured or killed in a crash if they were rear facing compared to forward facing. That is a difference of over 500%! As a result, in our 2011 policy statement on child passenger safety, the American Academy of Pediatrics issued guidance stating:
"All infants and toddlers should ride in a rear-facing car safety seat (CSS) until they are 2 years of age or until they reach the highest weight or height allowed by the manufacturer of their CSS.l"

The reason that car crashes are so deadly is that they involve a tremendous amount of energy. Let me illustrate: A 10 pound bowling ball

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dropped from a third story window would hit the ground with 330 pounds of momentum. No one would be willing to catch that bowling ball, because the energy of the ball would be transferred to the person catching it, resulting in injury, most likely severe fractures. Now imagine a 10 pound baby travelling in a car at 30 MPH. Realize that a 10 lb. baby represents a tiny infant, from birth through about 2 months of age, and a 30 MPH is a relatively low rate of speed. In a crash, the infant represents 450 lb. of momentum, which is 40% more than the bowling ball.

Isaac Newton described 3 fundamental laws that explain the behavior of bodies in motion. Distilled down to their essence, they tell us that if something is moving, it stays moving until something stops it, and that the energy it represents through its weight and motion cannot just disappear. This means that a baby moving at 30 MPH will keep moving that fast until something stops it, and that all the energy it represents, those 450 lb. of momentum, must to be dissipated in a way that will not lead to injury.

Car safety seats help protect children in 5 important ways:

1. The prevent ejection from the vehicle. A person is 4 times more likely to die if they are ejected.
2. Spread the forces of the crash over as wide a surface area as possible
3. Prolong the period of deceleration for the people in the car; this leads to less overall force that must be dissipated.
4. Contact the strongest parts of the body
5. Protect the most vulnerable parts of the human body, specifically the head, neck and spinal cord.

The reason that rear-facing seats are so much safer has to do with points 2-5 above. If an adult in a seat belt is in a crash, they are thrown forward into the seat belt at the speed that the vehicle is travelling at the time of the crash. Their body collides with the seat belt webbing, which contacts their shoulders/chest and pelvis. This is adequate for adults. However,we know that children are anatomically and physiologically very different than adults, with relatively larger and heavier heads, weaker necks, and fundamentally weaker skeletons than those of adults. This places them at significantly higher risk for serious injury in a crash.

Travelling rear facing decreases these risks through several specific mechanisms:

1. The crash forces are spread over the largest possible surface area. In a crash, the rear-facing child is compressed into the car safety seat, spreading the crash forces over their entire back, literally from head to toe. Spreading out the forces significantly decreases the risk of injury. To illustrate this principle: Take your index finger, and lush it *into* your cheek. It should be somewhat painful. Now take an open palm and push into the same cheek with the

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same force. The pain should be minimal. Same force, spread over a larger area, means less risk for injury.

2. The crash forces are spread over parts of the body that can take it, specifically then entire backside of the child
3. The head, neck and spinal cord are directly and specifically protected, and this effect is seen with all types of crashes, be they forward, rear-end, side impact, roll-over, etc.
4. The car safety seat itself absorbs much of the crash forces, prolonging the period of deceleration, thus decreasing the amount of force transmitted to the child.

The photo below illustrates the difference between rear facing and forward facing crashes on a crash test dummy:

We know that passage of common sense laws is the most effective means for changing behavior in injury prevention.

- A 2010 study published in Pediatrics showed that New York State's upgraded CPS law led to an 18% reduction in traffic injury rates for children aged 4-6 years in booster seats[2].
  A 2012 study of new booster seat laws in five states (Missouri, North Carolina, Pennsylvania, Wisconsin and Wyoming), found a 17 percent reduction in the per capita rate of children who sustained fatal or incapacitating injuries3.
- As of 1/17, 4 states have passed legislation requiring rear facing car safety seats until age 2: California, Pennsylvania, Oklahoma and New Jersey.
- A number of others (at least 6 including Oregon) have introduced similar bills this year.

Since the AAP policy statement was published in 2011, all convertible car safety seats have rear facing weight limits of at least 40 lb. and 43 inches. A 95 percentile 3-year-old boy weighs only 38lb. and is 40 inches long, meaning that virtually every child, certainly well over 99% of children, will fit safely and comfortably in rear facing car safety seats. While many parents worry about the safety of arms and legs rear facing, it turns out that extremity injuries are fleetingly rare in rear facing crashes. As noted above, the overall risk of injury is over 500% less rear facing compared to

forward facing.

The point is not to punish families, but to help shift the attitudes and norms, as many families look to the law as the arbiter of best practice. Simply put, we know that while the law of the land can change, the laws of physics never do. This means that we need to help families protect their children from the energy generated in car crashes, and one of the best way to do that is with a rear facing car safety seat.

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