



TECH UPDATE

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Recent Research: Child Safety when Grandparents are Driving

Have you ever worried about safety when grandparents are driving your kids? A new study from the Children’s Hospital of Philadelphia (CHOP) might make you feel better. The CHOP researchers looked at crashes involving over 11,000 children. The crashes happened between 2003 and 2007. About 10 percent of kids were driven by grandparents. Parents drove in the rest of the cases.

When grandparents drove, kids who were in crashes were about 50 percent less likely to be injured. Since grandparents in the study had slightly more child restraint misuse than parents, this was especially surprising. The researchers did not find any differences in vehicle type, crash severity and vehicle speeds that could explain the differences in injury rates. The main thing that seemed to matter was the driver being a grandparent instead of a parent.

Take home message: Children riding with grandparents might be safer than riding with parents. However, grandparents need to learn about the best CPS practices.

Reference: Henretig FM, Durbin DR, Kallan MJ, Winston FL (2011) *Grandparents Driving Grandchildren: An Evaluation of Child Passenger Safety and Injuries.* Pediatrics 46.



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Recent Research: Factors Affecting Head Injury in Side Impact

A new study highlights the importance of a snug harness and proper chest clip use. Researchers in Japan ran tests to study factors affecting child head injury in side impacts. They used a new European 3-year-old side impact crash test dummy, called the Q3, in a forward-facing convertible child restraint. First they ran a crash test where an SUV hit the front passenger door of a small car at a 45° angle. The 3YO dummy was in the back seat on the side of the car in the seat closest to the impact. They installed the child seat using a seat belt. The seat belt was tight, but they left about 3 inches of slack in the harness straps to simulate a common misuse. In the test, the dummy shoulder slipped out of the harness and let the head move past the side wings and hit the door.

Next, they designed a test fixture that allowed them to copy the in-vehicle crash test results in the lab. Then, they changed conditions one at a time in each sled test to see what is important in side impacts. They ran tests with and without a chest clip, and with and without 3 inches of slack in the harness. In the test with no chest clip and 3 inches slack, the head moved sideways over 3 inches further compared to the condition with a chest clip and no slack. When testing only a missing chest clip, the head moved further sideways by about 2 inches compared to correct use, and the dummy's shoulder slipped out of the harness. When testing with just a loose harness, lateral head excursion also increased by about 2 inches compared to correct use.

Real-world application: Using the chest clip properly and making the harness snug can make a big difference in protecting children in side impacts. Two inches of head excursion could be the difference between head injury from head contact and no injury in a crash.

Reference: Yoshida R, Okada H, Nomura M, Mizuno K, Tanaka Y, Hosokawa N (2011) *Head impact mechanisms of a child occupant seated in a child restraint system as determined by impact testing.* Stapp Car Crash Journal 55:117-139.

New Product Update: Prodigy Infant Seat



A new infant CRS with some unique features is on the market, called the Prodigy Infant Seat. It is designed for rear-facing travel for infants who weigh between 4-32 pounds and are less than 32 inches in length. It can be used with or without the base.

One unusual feature is an electronic display on the base. It guides the consumer on the order of the installation steps. It also provides feedback on some steps of correct installation. The display prompts the installer to connect the base to the vehicle using either LATCH or the vehicle seat belt. When this step is complete the user presses a button. The screen then lights either a smiley face or a warning triangle to give feedback whether the seat is tightly installed and the base angle is correct. When installing with LATCH, the seat has a ratcheting crank to tighten the LATCH belt. If installing with a seat belt, the LATCH belt must be partially unthreaded so that the vehicle seat belt can be routed through the path.

The harness design is also unique. When you pull the strap between the legs to tighten the harness, it also adjusts the harness to the correct height relative to the shoulders. The manufacturer suggested price for the seat is \$179.

Other child seats have provided installer feedback. However, most previous attempts have used audio feedback rather than a visual display. As a CPS tech, always encourage parents and caregivers to read the instructions completely. While feedback can be helpful, the 1" test still works for checking tightness of installation, and there's a level line on the side of the restraint to check recline angle.

Regulatory Review: Having Your Say in the Way Government Approaches CPS

Want to keep up with changes in US regulations or programs that impact CPS? Then get to know the Federal Docket System. The Federal Docket Management System (FDMS) is found at regulations.gov. It uses the web to gather public ideas on government activities, including changes to regulations (like FMVSS 213 or FMVSS 225) and consumer information programs (like the CRS usability rating system). Any possible changes will be posted for public comment through the FDMS at regulations.gov. You usually have 30-90 days to post your input. Anyone is allowed to comment, not just businesses or experts.

Helpful terms to know when using the system are:

NPRM stands for “Notice of Proposed Rulemaking”. NPRMs are issued when the government has an idea of how to improve regulations and wants the public to comment.

SNPRM stands for “Supplemental Notice of Proposed Rulemaking”. It is similar to the NPRM but adds information to a topic that has already been posted in the system.

Final Rule means that the government has considered all the comments received. They post their final decision on how to move forward to create or change a regulation.

NHTSA will also post information about consumer information systems on the FDMS. These are NHTSA programs, but not legally required through a regulation. An example is the vehicle/child restraint fit program that was proposed in 2011.

Since many different agencies use this system, it can be overwhelming. There is online help offered. You may want to narrow your search to the agency “NHTSA” to get better results. Most CPS information will come up when you search with keywords such as: “Child Restraint Systems”, “LATCH”, “FMVSS 213” or “FMVSS 225”.

You can also sign up for e-mail notification. The system will send you a message when something is posted on regulations.gov that relates to a regulation of interest. For instructions on how to sign up, go to www.regulations.gov and click on the “help” tab at the top of the page. Look for “sign up for e-mail alert” and follow the instructions.

Seat Check Smarts: Using Tethers with Seat Belt Installations

Techs use the term LATCH all the time. Don't forget that it describes two things: lower anchors and tethers. You should always use the top tether when installing forward-facing CRS with lower anchors. However, you can also usually use the top tether when using the seat belt to install a forward-facing CRS. If a child is in a severe crash, the top tether will keep the child's head about 6 inches further back. So using the top tether gives a major safety benefit by reducing the potential for head injury.

Federal laws describe what needs to be in vehicle manuals about installing a CRS with LATCH. However, there are not as many rules for seat belt installation instructions. Therefore, some vehicle manufacturers do not stress that you can use the top tether with the seat belt. But all vehicle manufacturers allow it. Emphasizing this message for parents is a way CPS techs can make a big safety difference.

University of Michigan Transportation Research Institute (UMTRI) staff checked 95 vehicle manuals for 2010-2011 vehicles. They could only find details about LATCH weight limits in Ford products. Ford usually lets you use tether and lower anchors with kids up to 48 pounds. When using the tether and the seat belt, Ford does not have a tether weight limit.

If you can't find weight limits in vehicle manuals, check the LATCH manual. It lists weight limits for tether and lower anchors for most manufacturers. If no weight limits are listed in the LATCH manual or the vehicle manual, the CPS curriculum states that 40 pounds is the assumed weight limit for tether and lower anchors.

Remember, no matter where the weight limit is stated, you need to follow the vehicle manufacturer's weight limits. If the child weighs more than the lower anchorage weight limit, you need to install with the seat belt. If the child weighs more than the tether anchorage weight limit, you can't use the tether.

Focus on Testing: What Dummies Measure

FMVSS No. 213 tests child restraints systems (CRS) using different sizes of crash test dummies. Different dummies are used depending on the weight range of the product. Dummy sizes include a 6-year-old, 3-year-old, 12-month-old, and newborn. Each dummy is about the average size and weight of children in that age group. They are designed to bend and move in ways like a child would. Some dummies have internal sensors that are used to tell us if the child might be injured in a crash.



The smallest dummy is the newborn infant. CRS used by infants less than 12 pounds are tested with it. A CRS passes if the dummy stays in the CRS using the lowest harness slots and rear crotch belt position during the test. The CRS must also not rotate forward so the back angle goes over 70 degrees. The dummy weighs 7 pounds. It has a leather skeleton and attached weights to represent the masses of the head, torso, and limbs of a newborn. The skin is made of canvas covering foam padding. It does not contain any internal sensors because there is not enough data on infant response and injury to develop reliable ways of interpreting measurements. The dummy's body is very flexible to represent the "floppiness" of a newborn.

The 12-month-old dummy is used to test CRS used by children from 13 to 22 pounds. It weighs 22 pounds. CRS with a weight range from 23 to 40 pounds are tested with a 3-year-old dummy weighing 36 pounds. CRS made for kids weighing more than 40 pounds are tested with a 51-pound 6-year-old dummy. For CRS used by kids greater than 50 pounds, a "heavy" 6-year-old dummy is used. Weight is added to the regular 6-year-old to make it weigh 62 pounds. These dummies have body parts made of steel, rubber and foam covered by vinyl skin. They are designed to move and bend like children.

The three un-weighted dummies have accelerometers in the head and chest. Accelerometers measure how fast the head and chest slow down during the crash. The data from the head sensors are processed to calculate the head injury criterion (HIC). FMVSS No. 213 has a limit of 1000 for HIC. With a HIC of 1000, about one in six children will suffer a life-threatening injury to their brain. There is also a limit for the chest sensor levels. The limit prevents the harness or seat belt from loading too much and causing chest injury. The sensor data is not collected for the heavy 6-year-old dummy.

When a CRS is crash tested, the dummy loads the CRS like a real child would during a frontal crash. This checks the strength of the CRS structure and harness. The CRS cannot break or move in a way that would let the child move too far forward. If the child moved too forward, they could contact the vehicle interior. This is the most common cause of child injury in crashes. The CRS must not break during the crash and create sharp edges that could cause injury.

There are other sizes of dummies, but they are not used in FMVSS No. 213 testing. There are dummies the size of a premature infant, a 6-month-old, an 18-month-old and a 10-year-old child. The 10-year-old dummy weighs 80 pounds. FMVSS No. 213 will probably be updated soon to use the 10-year-old to test booster seats and CRS with higher weight limits. There are also other styles of dummies used outside the US.

The current dummies have some limitations. They do not measure loading around the abdomen. If a CRS lets the harness or the vehicle lap belt load the soft belly instead of the bony pelvis, the dummies can't measure these loads. Each dummy represents the average size and shape of a certain age group. They don't represent different sizes of children, such as a short, overweight kid. Also, dummies are tested so they sit up straight in an ideal seated position. Real kids wiggle and could be in other positions during a crash.

Even with these limitations, dummies have let manufacturers develop CRS that work well to prevent injury in crashes. Research studies are underway to make dummies more realistic and allow more injury measurements. Computer modeling is also being used to represent children of other sizes.

Seat Check Smarts: Adjustable Seatback Angles in Rear Seats

Some vehicles have adjustable seatbacks in the rear seat. Does it matter how we adjust them during a child restraint install?

University of Michigan Transportation Research Institute (UMTRI) staff just checked 95 vehicle manuals of 2010-2011 vehicles. Over half do not say anything about adjusting seatbacks when installing a child restraint. About 30 manuals say the seatback should be upright. The other 10 manuals state that a specific position should be used, such as two notches back from full upright.

If a vehicle manufacturer says a certain angle must be used, you must use it. This means some child restraints may not fit in some vehicle seats.

If there are no rules about seatback angle, here's an install tip for forward-facing child restraints. Adjust the seatback 2 or 3 notches back from upright. Install the child seat with the seat belt or the lower anchorages and tighten until snug. Then tip the seatback forward until it presses against the child seat, tightening the install as you do it.

Some seatbacks are adjustable so they can be stowed or allow cargo transport. But this doesn't mean adults and kids in seat belts can adjust them to any angle for travel. If a seatback is too reclined, you could slide up the seatback in a rear impact. In a frontal crash, a more reclined seatback means your upper body has to rotate forward a lot before the shoulder belt can do its job. Check the vehicle manual to see if there are any rules about seatback angles for adults and older kids. Most vehicle manufacturers design their seats to be used 1 to 3 notches reclined from the full upright position. If there's a gap between the shoulder and shoulder belt, the seatback should be moved forward when possible.

What about booster seats? The rules about adults and kids sitting on seats should apply, because the seat belt restrains the kid, not the booster.

CPS Calendar

Advances in Child Injury Prevention Conference

May 2012, Plymouth, MI
Watch for information on the CCHIPS link www.research.chop.edu

A conference that reviews new research in child passenger protection for children ages 0-18 years.

Lifesavers Conference

June 14-16, Orlando, Florida
www.lifesaversconference.org

A conference that covers a wide range of national highway safety issues and includes child passenger safety topics.

Kidz In Motion Conference

August 15-18, Orlando, Florida
www.kidzinmotion.org
A conference focused solely on Child Passenger Safety.

Teleconferences

CRS Manufacturer Update: Evenflo
May 23, 2012 1:00-2:00 pm ET
CPS CEU available: 1
For more info: <http://bit.ly/Evenflo2012>
Portable CRS: BubbleBum, Safe Rider Vest, E-Z-On Vest
June 20, 2012 1:00-2:00 pm ET
CPS CEU available: 1
For more info: <http://bit.ly/CPSJune20>

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National Child Passenger Safety Board
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I can't believe someone did this...

In this picture, the lap and shoulder belts are wrapped around the seatback of the rear-facing child restraint instead of routed through the belt path. This seat could rotate completely out of the belts and become a projectile in a crash.

Submitted by UMTRI, Ann Arbor MI. Performed by a volunteer test subject in a study of child restraint installation errors.



Help with Our Next Issue

Do you have ideas for our next issue? Email us at CPSTechUpdate@umich.edu with suggestions for columns. These could include:

- Pictures of unusual child seat installations for "I can't believe someone did this?"
- Name and email of a CPS technician who you would like to see interviewed
- Research you heard about on the news
- New product features
- Issues that have come up at seat checks

Win Our Contest

Sign up to be notified via e-mail when future editions of Tech Update are published and whenever significant announcements or updates to the CPS Board website are made.

Signing up also makes currently certified CPS technicians and instructors eligible to WIN a free CPS recertification—a \$50 or \$60 value—from Safe Kids Worldwide. To read the rules for the drawing and sign up for the CPS Board e-mail list, visit www.cpsboard.org/elist.htm.

This month's contest winner is Olga Nowlan. Congratulations Olga!!!

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Technician Spotlight

Starting with this issue of CPS Tech Update, we will interview a CPS Technician about their experiences. This month, meet *Sharon Conrad*, a CPST-I who is a program manager at the Georgia Department of Public Health.

- 1) How long have you been a CPS Tech? Since 1998.
- 2) Where do you do most of your car seat checks? We have over 140 counties in Georgia that participate in a car seat program, so I do quite a bit of on-site visits to assist these counties, as well as safety checks with law enforcement, Safe Kids events, etc.
- 3) What prompted you to take the training? I met Page Ashley who was a very active and passionate certified CPST in South Florida. I assisted as a scribe for many events before attending the 2nd CPST training class in South Florida. Like many, I realized that my own children were not placed in CRS correctly. Working with a law enforcement agency, I dragged 4 officers with me to go through the CPS certification process. We were one of the first law enforcement agencies in South Florida that became certified. Within a short period we had numerous requests from other agencies to assist them with CPS education and within 1 year, I became certified as a CPST instructor.
- 4) What is your favorite CPS resource? LATCH Book, car seat and vehicle owner's manual - cannot do without any of them!
- 5) What is your favorite installation hint? Allow the parent/caregiver to install the CRS, walk them through the installation process, have them repeat over and over until they feel confident and comfortable with the installation. Very rewarding to see the parent/caregiver demonstrate the "can do" attitude and "thanks, hugs" for you taking the time to assist them when they realize how much safer their children are riding.
- 6) What is the worst weather you've ever experienced at a car seat check? Very unusual in Georgia to experience rain, wind, sleet and snow in one day - it did happen! We checked over 40 car seats on that given Saturday.
- 7) What do you think is the best new feature among recent new child restraint products? The harness system that simply slides for an accurate fit every time and never needs rethreading!