

Child Passenger Safety for Non Experts

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The Rainbow Injury Prevention Center Mission

- 1) to work directly with children and families through education and outreach to decrease injury risk and improve wellbeing,
- 2) to share creative ideas, resources and information with all members of the Greater Cleveland community interested in protecting children, and
- 3) to advance the body of knowledge in unintentional injury prevention research

What We Do

- injury prevention programs
- partnerships
- advocacy
- regional child passenger safety
- traffic safety
- lending library
- education
- research

Regional Child Passenger Safety Program

- oversees CPS activities in five counties
- trains NHTSA-certified CPS techs
- free Car Seat Checking Station, where parents can have their car seats checked for correct installation, selection, recall
- low-cost car seat distribution classes for income-qualified families
- infant seat classes for expectant parents
- car seat checkup events throughout a multi-county region



Special Needs Transportation

- Hospitalized children may have short or long-term challenges that prevent them from fitting correctly into a conventional child restraint
- Injury Prevention Center staff work closely with orthopaedics, NICU, specialty clinics
- Provides specialized car seats and motor vehicle restraints to patient families on a loaner basis or at reduced cost



TBI and Motor Vehicle Crashes

Don't kids in crashes mostly have abdominal injuries?



No—the brain is the most frequently injured body region for children in motor vehicle crashes

The Issue

- motor vehicle crashes are second only to falls as the cause of TBI in children
- motor vehicle collisions are associated with more severe cases of brain injury
- motor vehicle collisions are the leading cause of TBI-related hospitalizations and death

What kinds of crashes put kids most at risk?

- head injuries are most common in side impact (lateral) and rollover crashes
- spine and ortho injuries are more likely in frontal crashes
- in a study of 417 children injured in mv crashes, severe head injuries were diagnosed in 43% of the children in lateral crashes and 18% of those in frontal crashes

Which crashes are most common?

- frontal crashes are the most common (41% of all crashes, followed by side (30%), rollover (16.5%) and rear (10%))
- frontal crashes result in the largest number of severe injuries overall to children 0-7 (38% of children with police-reported incapacitating injuries are in frontal crashes)
- *however*, while rollovers are the least common crash type, they result in the highest rate of severe injuries (12% of children in rollover crashes have police-reported incapacitating injuries, versus 1.5% of children in side impact and 1.2% of children in frontal impact crashes)

What are the mechanisms of brain injury in motor vehicle crashes?

- contact with structures in the vehicle (seat back, door/window, roof)



- contact with other objects in vehicle (other passengers, unsecured objects)



- high head excursion (the distance the child's head moves in the direction of impact or on rebound from a crash)
- brain injury can occur without contact with the vehicle interior—when head is suddenly twisted with the deceleration of a crash, the brain moves around as well



How long are children affected?

- children with even mild TBI associated with motor vehicle-related trauma had higher rates of both transient and persistent postconcussive symptoms (both cognitive and emotional/behavioral) than children with other severe injuries
- problems persisted even 12 months post-injury

How can risk of motor vehicle crash-related head injury be mitigated?

- Proper restraint use makes all the difference.
- 10 years ago, motor vehicle crashes were the leading cause of death for U.S. children.
- Today, that's true only for children ≥ 10 (but still in top 3 causes for children 1-9).
- Why? Increase in car safety seat and booster seat use nationwide.

What is “proper” restraint use?

- using the child restraint method appropriate for a child’s age, height and weight
- securing the child in the restraint in the correct way
- securing the restraint in the vehicle in the correct way

Child restraints and TBI

- correct use of restraints (car seat, booster, seat belt) reduces the risk of moderate-to-maximum head injury to less than 1%
- risk of moderate-to-maximum head injury for unrestrained occupants was up to 7%
- the protective effect was most dramatic for infants, but seen in all age categories (infant to adolescent)
- 2- to 5-year-old children secured in seat belts are 4 times more likely to suffer a head injury compared to children in child restraints

Child safety seat misuse estimated from 63%-88.5%

- incorrect CSS type for age/weight
- in right CSS, but facing wrong direction
- in CSS, but in front seat
- not in CSS, but using seat belt



Other common mistakes

- CSS not secured in car with seat belt
- seat belt not locked
- seat belt routed the wrong way
- harness straps too loose



Egregious Errors



Who is using child restraints? (or, who is *not* using them)

- use highest for infants, then gradually decreases as children get older
- male and female use of car seats is similar, but girls are more likely than boys to be restrained in booster seats or seat belts
- African Americans less likely to be properly restrained or restrained at all
- in 2008, 98% of children 0-3 riding in the back seat
- 88% of children 4-7 riding in the back seat



Restraint use by age (U.S., 2008)

children < 1

- **79% rear facing CSS**
- 16% forward facing CSS
- 1% seat belt/booster
- 3% unrestrained

children 1-3

- **2% rear facing CSS**
- **72% forward facing CSS**
- 14% booster seat
- 4% seat belt
- 8% unrestrained

children 4-7

- 12% forward facing CSS
- **43% booster seat**
- 34% seat belt
- 11% unrestrained

children 8-12

- 1% forward facing CSS
- 5% booster seat
- **78% seat belt**
- 15% unrestrained

Counseling parents: knowing the basics

Rear facing child restraint

- Ohio law is nonspecific: children <4 years of age AND <40 pounds in weight must be in CSS, following instructions on CSS (generally, can't be turned forward until 1 yr/20 lb)
- AAP recommendations: remain rear-facing for as long as the child does not exceed the rear-facing limits of the seat
- AAP considering recommendation of rear-facing to age 2



infant only (3-4 lb. min. weight, up to 35 lb max)



convertible (most go to 35 lb. rear facing, some to 45)

How do rear-facing seats protect the brain?

- spreads crash forces across the whole area of a child's back, head and neck
- prevents the head from snapping relative to the body
- increases ride down time—by increasing the time it takes to stop, CSSs significantly decrease total force on the child



Forward facing child restraint

- Ohio law: children <4 years of age AND <40 pounds in weight must be in CSS (i.e., must be in CSS until they hit *both* milestones)
- AAP recommendation: children should remain in a harnessed seat until they have reached the height and weight limit of the seat before transitioning to a booster seat (but no sooner than age 4 *and* 40 lb)



Seats generally accommodate children up to 50-65 lb., but some go as high as 80 lb.

How do forward-facing seats protect the brain?

- represents a decrease in protection from rear-facing seats
- spreads crash forces across a child's torso
- decreases force on child by increasing ride down time
- prevents child's head from contacting vehicle structures (*if* harnesses are tight)
- head and legs are thrown forward like a rag doll



Booster seat

- Ohio law: children ≥ 4 years of age who are not otherwise required to be in a child restraint system, until they have reached either 4'9" in height or 8 years in age
- AAP recommendation: older children who have outgrown their forward-facing car safety seats should stay in a booster until adult belts fit correctly (usually when a child reaches about 4'9" in height and is between 8 and 12 years of age)



How do booster seats protect the brain?

- seat belts are for adults, not kids
- because seat belts do not fit well on small bodies, they can distribute crash forces over soft tissue areas
- boosters spread crash forces across bony areas—the chest and pelvis
- increases ride down time and decreases force of brain as it comes in contact with skull
- prevents contact with vehicle structures

Danger of moving to a booster too soon



When seat belts don't fit comfortably, children tend to place the shoulder belt behind their backs or under their arms.

Backless vs. high back booster— what's the difference?

- High-back boosters provide head support and whiplash protection in vehicles that do not have head rests or have low seat backs.
- Backless boosters are usually less expensive and are easier to move from vehicle to vehicle.
- Backless boosters can be safely used in vehicles with headrests and high seat backs.



Seat belt

- Children who have outgrown booster seats should ride in lap and shoulder seat belts.
- Children should ride only in the back seat until 13 years of age.
- Children are ready for lap/shoulder belts when they can place their backs firmly against the vehicle seat back with their knees bent comfortably over the vehicle seat cushion.
- Lap belts should fit low and snug on the upper thighs.
- Shoulder belts should rest over the shoulder and across the chest.



How do seat belts protect the brain?

- for children who fit well in a seat belt, the lap and shoulder belt spreads crash forces across bony areas—the chest and pelvis—rather than soft tissue areas
- increases ride down time and decreases force of brain as it comes in contact with skull
- prevents contact with vehicle structures



Add-on (Aftermarket) Products

- Devices sold separately from car seats, (toys, positioning or tightening devices, or thermal covers).
- Most have not undergone testing and many have no government standards policing their safety value.
- Packaging may include claims that a product meets safety standards—technically true but misleading because there are no applicable standards.
- Most car seat manuals include warnings about aftermarket products because they can violate the integrity of the seat. In most cases, using them renders the seat warranty null and void.



Rely on the experts

- know the basics, but know when to refer to experts
- you can do more harm than good if you try to answer questions you're not sure about (and incur liability for yourself and your institution)
- do not help with installation or give installation instructions if you're not certified (being a parent isn't enough—most parents get it wrong!)

What makes someone a child passenger safety "expert"?

- take and pass a 32-hour course developed by NHTSA and overseen by Safe Kids USA
- course mixes lectures and hands-on activities
- must recertify every 2 years by demonstrating field skills, documenting active practice, and con ed

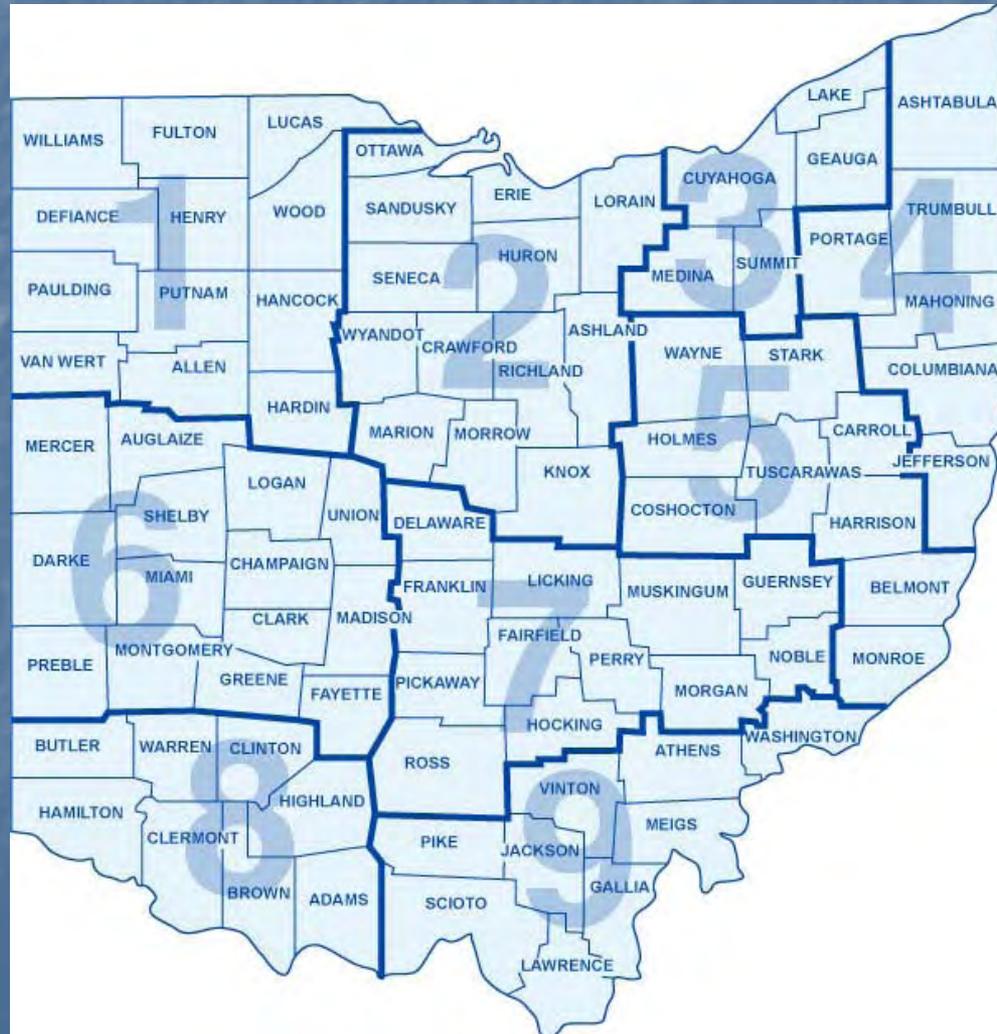
What's the big deal—why can't anyone who has experience with kids give CPS advice?

- complex and ever-changing field
- huge variety of seats on the market
- vehicle seats and seat belt configurations vary from vehicle to vehicle
- CSS manufacturers and auto manufacturers have different rules about where a CSS can be placed in a vehicle and how it should be secured
- LATCH system
- risks and liability issues for you and your institution
- proliferation of misinformation

Finding resources

- Ohio currently has 9 regional child passenger safety coordinators (with regions based on population and population density)
- Can provide information about child safety seat checkup events, referral source for parents
- Find the children's hospital in your region and learn whether they have a child passenger safety program

Find your regional coordinator at
http://ohiohighwaysafetyoffice.ohio.gov/otso_safety_coordinators.stm#region1



Link to your local children's hospital at
<http://www.ohiochildrenshospitals.org/>



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