

Transporting Preschoolers and Young Children with Special Healthcare Needs

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Objectives

1. To review common transportation considerations for children who benefit from specialized seating and mobility devices
2. To summarize how to match children with commercial products that can meet these needs.



Children and MVCs: Leading Causes of Death in US by Age

rank	<1yr	1-3 yr	4-7 yr	8-15 yr	16-20 yr
1	Perinatal Period 14,106	Congenita Anomalies	MVCs 495	MVCs 1,584	MVCs 6,327
2	Congenita Anomalies 5,623	MVCs 410	Malignant Neoplasm 449	Malignant Neoplasm 842	Homicide 2,422
3	Heart Disease 500	Accidental Drowning 380	Congenita Anomalies 180	Suicide 428	Suicide 1,810



Protection Offered by Seatbelts and Child Restraints

- Prevents ejection - ejected occupants are:
 - 4 times more likely to die and
 - 14 times more likely to sustain cervical spine injuries



Protection Offered by Child Restraints

- Distributes crash force over the body
- Directs force to bony skeleton
- Allows the occupant to ride down the crash and stop over the full duration of the event
- Protects head and spinal cord by limiting forward excursion and deterring localized loads



Child Safety Seat Effectiveness

- Designed primarily for frontal impact but field effectiveness is for any type of crash
- 71% effective in reducing deaths for infants (RF)
- 54% effective in reducing deaths for toddlers (FF)
- Reduces the need for hospitalization by 69%
- Booster seats reduce a child's risk of injury in a crash by 59%



Who is a CPST?

- CPST = Child Passenger Safety Technician
- A person who has taken and passed the multi-day national standardized course on child passenger safety and maintained their certification through hands on demonstration of skills and continuing education
- Functions to educate parents and caregivers on best practices in keeping kids safe in motor vehicles
- Knowledgeable on how to properly install child restraint systems
- Aware of local, national, and internet resources for problem solving



How to find a CPST

Listings and lookup features to locate a CPST at:

www.nhtsa.gov

www.usa.safekids.org



The Team Approach

A range of expertise is needed to determine the correct equipment and procedures for safe transportation.

The team may include:

- Clinician (physician, nurse, OT/PT)
- Child Passenger Safety Technician
- Transportation provider
- Parent/caregiver
- Child
- Manufacturer Rep
- Rehab Technology Supplier



Difference between crash protection and postural positioning



Unsurvivable Crashes

Restraint systems are designed to protect from crash forces and conditions that are most likely to occur

Many factors determine injury outcome (size, mass and velocity)

Seat belts and airbags or CRS offer best chance of survival



Child Restraint Selection: NHTSA's 4 Steps for Kids



- Step 1 – Rear-facing until AT LEAST 20 lb AND 12 month**
Best practice – Rear-facing as long as possible, until the limit of the restraint is reached. Most convertibles go rear-facing to 30 lb
- Step 2 - Forward-facing with five point harness until at least 40lb**
Best practice - In harness as long as possible – several models accommodate children over 40 lb
- Step 3 – Booster seat with lap/shoulder belt until 8 years of age**
Best practice – use booster until 4'9" tall no matter what age
- Step 4 - Lap/shoulder belt**
Best practice – all kids under 13 years in the back seat with lap/shoulder belt



Best practice for CRS use/installation

- Fits child-height and weight limits
- Check harness slot height relative to child's shoulders
 - slot must be **below** shoulder for rear-facing
 - slot must be **above** shoulder for forward facing



Best practice for CRS use/installation

- Snug harness (pinch test of harness webbing at shoulder)
- Tight installation (less than 1 inch of side-side or fore-aft movement when pulled at the belt path)
 - Note: not every car seat can be properly installed in every vehicle, you need to work with clinicians and CPSTs to determine the best product match
 - Refer to product and vehicle owner's manual for detailed information on features and installation instructions



Common Child Restraint Errors

- Nonuse 40%
In 2001, 2197 children aged 0-14 died as vehicle occupants and 55% of those were unrestrained
- Misuse at least 80%
Most detailed CRS inspection sites and fitting stations reports misuse rates over 90%

Medical conditions that may create challenges for transportation

- Low birth weight
example: baby can not tolerate a semi-reclined position
- Orthopedic issues
example: child who can not bend his hips, (temporary or chronic)
- Developmental or behavior issues
example: child who unbuckles her seat belt



Medical conditions that may create challenges for transportation

- Neuromuscular disorders
example: child who is unable to hold her head upright
- Respiratory issues
example: infant who requires supplemental oxygen
- Gastrointestinal issues
example: Child who has a G-tube



Special medical/positioning child restraints

Conventional seats with high harness weight limits



Dream Ride Car Bed
Angel Ride Car Bed

Snug Seat Hippo



See Special Needs Child Restraints Brochure for more details



Special medical/positioning child restraints

Britax Traveller Plus
Carrie Seat
Columbia Medical Seat
Recaro
Roosevelt
Special Tomato



EZ On Vests
Ride Safer Travel Vest

See Special Needs
Child Restraints Brochure
for more details



Resource for Special Needs Transportation

National Center for the Safe Transportation of Children with Special Healthcare Needs

575 West Drive, Room 004

Indianapolis, IN 46202

Phone: 1-800-755-0912

Fax: 317-278-0399

Email: [Janell Yonkman, jyonkman@clarion.org](mailto:jyonkman@clarion.org)

www.preventinjury.org



Special medical/positioning child restraints on school buses

- Vehicle design
 - Not originally designed with the intent of transport preschoolers
 - Large, heavy, conspicuous vehicle with a built-in body reinforcement structure



Special medical/positioning child restraints on school buses

Bus crash severity

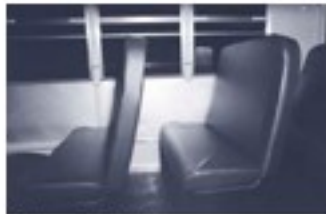
- Experiences overall lower range of crash forces
- Crash forces are distributed differently
- Passenger cabin usually stays intact

- Safest form of land transportation
- On average each year, 8 children die travelling to school on buses while 800 children die traveling to school in passenger vehicles



Special medical/positioning child restraints on school buses

- Compartmentalization
 - High padded seat backs
 - Closely spaced seats
 - May not have seat belt and/or LATCH (alternative installation method)



Maximum Seat Spacing



Special medical/positioning

- Conventional car seats only work if you have lap belt/LATCH available and enough space for installation
- Must meet FMVSS 210 bus seat frame if using seat belt/LATCH
- Cam wraps – system of webbing and buckles that wrap around the seat and back cushion to secure a restraint



Special medical/positioning child restraints on School Buses

A number of products specifically designed for school bus use



Resources for School Bus

- Federal Head Start Rules -Title 45 (essentially requires children who are preschool aged need to be transported in an appropriate child restraint as a condition for federal funding).
- NHTSA school bus curriculum – contact NHTSA regional rep
- NHTSA website (www.nhtsa.gov)
- FMVSS 222-School Bus Passenger Seating and Crash Protection (49 CFR Part 571) – updated in 2008
- National Conference on School Transportation and the National School Transportation Specifications and Procedures (www.ncstonline.org)
- State, local, and district rules.

Wheelchairs used as seats in motor vehicles

Basic Principles

1. Sit in a wheelchair that is oriented in the direction of vehicle forward travel
2. Secure the WC using a crash-tested (i.e., SAE J2249-compliant) wheelchair securement system
3. Properly wear a crash-tested seatbelt or 5-point harness
4. Use a WC19-compliant wheelchair designed to facilitate transportation



Wheelchair Tiedown and Occupant Restraint Systems

WTORS

Secures the WC to the vehicle making it a secure and supportive seat

Provides occupant protection for the rider via lap/shoulder belt.



SAE Recommended Practice J2249

Wheelchair Tiedown and Occupant Restraint Systems for Use in Motor Vehicles

WTORS must:

- provide independent WC securement
- provide both upper- and lower-torso belt restraints designed to apply restraint forces to skeletal regions of the pelvis and shoulder(s)
- be dynamically strength tested in 30-mph frontal impact using a 187-lb SWC and 170-lb crash dummy



ANSI/RESNA WC19 (WC19)

Wheelchairs Used as Seats in Motor Vehicles



Requires:

- 1) 4 easily accessible securement points for strap-type tiedown
- 2) WC-anchored lap belt (with shoulder belt interface)
- 3) "Crashworthiness" in a 30-mph frontal impact
- 4) Measurement and disclosure of rating for accommodation of vehicle-anchored seatbelts



WC19 Wheelchair Performance

- dynamic strength of WC, securement points, and belt restraints
- seat and seatback support for occupant
- retention of wheelchair components and batteries



Power Wheelchair



Stroller wheelchair



WC19 Improvements – 2009 Revision

Revisions to WC19, including:

- a requirement that wheelchairs achieve at least an "acceptable" rating for accommodation of belt restraints
- a requirement for wheelchairs to provide a five-point restraint harness for children under 50 lb



WC20 – Crash Standard for Seating Systems

A new standard for independent crash testing of WC seating systems using a surrogate wheelchair base (SWCB)



Wheelchairs used as seats in motor vehicles

Common questions/misconceptions

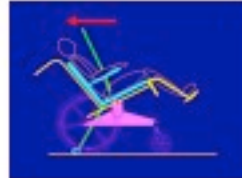
Seat and back support angle

The WC must allow a seated (i.e., generally upright) posture. This allows lap/shoulder belt to work effectively



Whenever possible:

- position the back support surface angle of 30 degrees or less relative to vertical
- tilt the seat rearward (front edge higher than back)
- achieve good lap/shoulder belt fit



Wheelchairs used as seats in motor vehicles

Headrests

WC headrests are designed to provide postural support, and not to provide protective benefits in a crash



can detach and become projectiles

to potentially help in a crash, it would need to:

- be located within 2-3 inches of the back of the head,



Wheelchairs used as seats in motor vehicles

How to secure a Non-WC19 wheelchair

Attach tiedown hooks to structural elements of main frame (welded joints and joints connected by hardened fasteners)

Choose points high on the frame but below the seat surface

Never hook to removable parts (no armrests, footrests, or wheels)

Assure tiedown straps take a straight-line path to floor

Wheelchairs used as seats in motor vehicles

- Never secure to removable parts



Transporting Extra Equipment

Neck collars/Stabilizers

- appropriate if child needs it to prevent medical complications such as eminent choking and neck instability
- don't add a collar just for travel
- if needed use the softest and lightest collar that will meet the medical needs
- Some evidence that collars can increase neck axial tension (along spinal cord) during a frontal impact event.



Transporting Extra Equipment

Trays – for communication or positioning
remove and secure elsewhere in the vehicle

if essential for use during travel – use a foam tray

if rigid tray is needed, add padding
although this does not eliminate abdominal injury concern



Transporting Extra Equipment

Medical Equipment

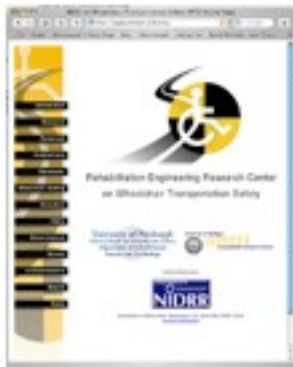
Cluttered
In hospital
rehab



less cluttered
Ready for discharge
Cargo strap??



Resources for Wheelchair Transportation Safety



<http://www.rercwts.org>

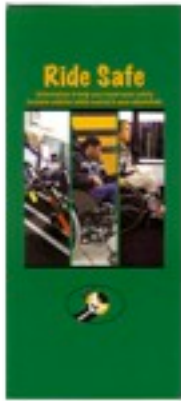
The RERC on Wheelchair Transportation Safety offers:

- List of crash-tested W/Cs
- Crash-test videos
- Frequently Asked ?s
- Consumer resources
- Educational resources
- Research tasks & projects

Current WC Transportation Regulations and Standards

- Existing Federal Regulations:
 - FMVSS 222-School Bus Passenger Seating and Crash Protection (49 CFR Part 571) - 1994
 - DOT Transportation for Individuals with Disabilities (ADA, 49 CFR Parts 27, 37, 38 - 1991
- Wheelchair Tiedowns and Occupant Restraint Systems (WTORS) Standards
 - SAE J2249, ISO 10542
- Wheelchairs Used as Motor Vehicle Seats Standards
 - ANSI/RESNA WC19
 - ISO 7176/19

Ridesafe Brochure



- Revised in 2008
- Available as glossy hardcopy
- Also on web at www.travelsafer.org

Postural Support Guideline Document



Risk is Part of Life, but we...

- Guide our risk-taking behaviors with knowledge of consequences and likelihood of experiencing them.
- Take reasonable precautions
- Exercise caution for those who are unable to speak or act for themselves

Contact Information

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