

CHILD PASSENGER SAFETY: TRANSPORTING CHILDREN WITH SPECIAL HEALTHCARE NEEDS

Missy Bryan, OTD, OTR/L, ATP, CPST
Sarah Haverstick, CPST

Disclosures

• Faculty for this activity have been required to disclose all relationships with any proprietary entity producing health care goods or services, with the exemption of nonprofit or government organizations and non-healthcare related companies.

- Sarah Haverstick, Goodbaby International

Note

• The products presented in these slides are not intended to be inclusive of every available child restraint and their inclusion in this presentation does not represent a product endorsement.

Objectives

- Define the rates of motor vehicle crashes and effect on children in the United States.
- Explain the importance of the use of medical child restraints for persons with special health care needs.
- Identify at least 3 major categories of specialized child restraint systems that are used in the transportation of persons with special health care needs.
- Identify at least 3 resources to promote transportation safety.

WHY TRANSPORTATION?

Rehab Therapist Knowledge

- Therapists report:
 - 53%: little or no knowledge
 - 79%: no formal training
 - 54%: no experience
 - 61%: little or no counseling with families on the subject
- Authors recommend continuing education for rehab therapists regarding safe transportation

(Blake, Sherman, Morris, & Lapidus, 2006)

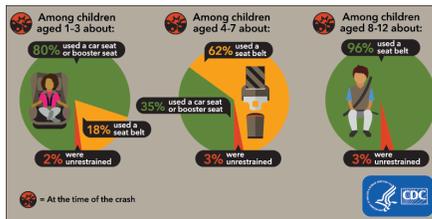
Motor vehicle crashes are a leading cause of injury death for children and young adults in the United States.

(CDC, 2014)

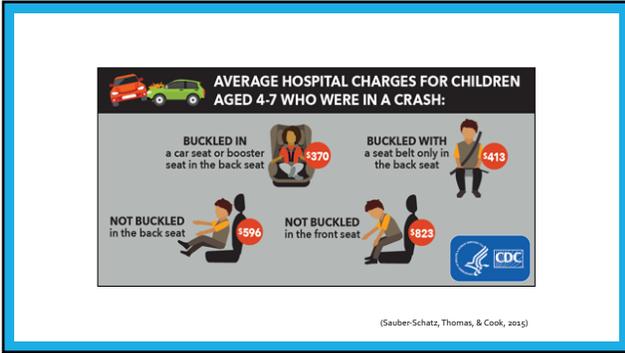
10 Leading Causes of Injury Deaths by Age Group Highlighting Unintentional Injury Deaths, United States – 2014

Rank	Age groups											Total
	<1	1-4	5-9	10-14	15-24	25-34	35-44	45-54	55-64	65+		
1	Unintentional Injuries 961	Unintentional Poisoning 388	Unintentional Injuries 345	Unintentional Injuries 341	Unintentional Injuries 631	Unintentional Injuries 618	Unintentional Injuries 615	Unintentional Injuries 7,007	Unintentional Injuries 7,037	Unintentional Injuries 7,054	Unintentional Injuries 7,077	Unintentional Injuries 27,564
2	Homicide 139	Unintentional Injuries 221	Unintentional Injuries 221	Unintentional Injuries 221	Unintentional Injuries 221	Unintentional Injuries 221	Unintentional Injuries 221	Unintentional Injuries 221	Unintentional Injuries 221	Unintentional Injuries 221	Unintentional Injuries 221	Unintentional Injuries 221
3	Homicide 149	Unintentional Injuries 149	Unintentional Injuries 149	Unintentional Injuries 149	Unintentional Injuries 149	Unintentional Injuries 149	Unintentional Injuries 149	Unintentional Injuries 149	Unintentional Injuries 149	Unintentional Injuries 149	Unintentional Injuries 149	Unintentional Injuries 149
4	Unintentional Injuries 179	Unintentional Injuries 179	Unintentional Injuries 179	Unintentional Injuries 179	Unintentional Injuries 179	Unintentional Injuries 179	Unintentional Injuries 179	Unintentional Injuries 179	Unintentional Injuries 179	Unintentional Injuries 179	Unintentional Injuries 179	Unintentional Injuries 179
5	Unintentional Injuries 49	Unintentional Injuries 49	Unintentional Injuries 49	Unintentional Injuries 49	Unintentional Injuries 49	Unintentional Injuries 49	Unintentional Injuries 49	Unintentional Injuries 49	Unintentional Injuries 49	Unintentional Injuries 49	Unintentional Injuries 49	Unintentional Injuries 49
6	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29
7	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29
8	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29
9	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29
10	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29	Unintentional Injuries 29

(CDC, 2014)



(Saubert-Schatz, Thomas, & Cook, 2015)



BACKGROUND

Child Passenger Safety

What is a CPST?

Child Passenger Safety Technician

- National certification program developed by the National Highway Traffic Safety Administration (NHTSA)
- Certification program began in 1997
- 24 - 32 hour standardized training
- Continuing education requirement for biannual recertification
- cert.safekids.org

CPS Recommendations

• New recommendations released by AAP and NHTSA:

- Birth – 12 months**
 - Always rear-facing.
- 2 – 3 years**
 - Rear-facing as long as possible.
 - Move to forward-facing once the rear-facing seat is outgrown.
- 4 – 7 years**
 - Forward-facing in a five-point harness.
 - Move to belt positioning booster seat once harness is outgrown.
- 8 – 12 years**
 - Belt positioning booster seat until 4' 9" tall and fits properly in vehicle seat belt.

(Durbin, 2013)

Conventional Transportation

In most situations a conventional child restraint will work for most children – even those with special healthcare needs.

Restraint selection considerations:

- Child's weight/height
- Child's age
- Vehicle
- Medical condition
- Medical equipment
- Requirements of the child restraint

Rear-Facing Only Car Seats

Harness:

- Low bottom harness slots (4 – 6 in)
- Multiple adjustment options

Removable base:

May provide adjustment to help ensure proper recline.



Head/body pillows:

- Check requirements for use.
- Head pillows may need to be removed.

Harness covers (not pictured):

May interfere with proper chest clip position with small infants.

Crotch buckle:

- May have adjustment options to assist with positioning.
- May have specific routing for newborns.

<http://www.everflo.com/car-seats/>

Convertible Car Seats (Rear-Facing to Forward-Facing)



Harness:

- Multiple adjustment options.
- Taller top harness slots to accommodate longer torsos (≥8+ in).

Seat pan:

- Inside width to accommodate larger children.
- Padding (comfort).
- Seat depth.

Head/body pillows:

- Check requirements for use.
- Head pillows may need to be removed.

Harness covers (not pictured):

May interfere with proper chest clip position with small infants.

Crotch buckle:

- May have adjustment options to assist with positioning.
- May have specific routing for newborns.

<http://www.evenflo.com/car-seats/>

Combination Car Seat (Harness to Booster)



Harness:

- Multiple adjustment options.
- Taller top harness slots to accommodate longer torsos (≥8+ in).

Adjustable base:

- May provide a recline option.
- Check instructions for weight restrictions.

Harness covers:

May be required for use in some situations.

Head/body pillows:

- Check requirements for use.
- Body pillows may help provide lateral support.

Crotch buckle:

- May have adjustment options to assist with positioning.
- May have additional padding for comfort.

<http://www.evenflo.com/car-seats/>

Belt Positioning Booster Seats



Fashion:

- Options that are appealing to older kids.
- Options that are discreet and blend with vehicle.

Cool factor:

Options for storage, reading lights, speakers, etc. Designed to appeal to older children.

Adjustable headrest:

- Moves up to accommodate torso growth.
- Provides head protection.

Shoulder/hip width:

- Some options may provide more width in the hip or shoulder.
- Some may expand out at the shoulder as the booster grows taller.

<http://www.evenflo.com/car-seats/>

Special Needs Transportation

- Additional training for CPSTs
- Created by the Automotive Safety Program at Riley Hospital for Children, with funding from the National Safety Council.
- Designed to expand the knowledge base of CPSTs in situations involving transporting children with medical conditions and procedures.
- 16 hour training, available to CPSTs.
- 52 instructors across the country.
- www.preventinjury.org

RESEARCH

Special Needs Transportation

Risk of Injury/Restraint Use

- Review of crash data to determine effect of seating position and appropriate restraint use on risk of injury to children in MVC.
- Unrestrained children in front were at the highest risk of injury.
- Appropriately restrained children in the rear were at the lowest risk of injury.
- Inappropriately restrained children were at nearly twice the risk of injury.
- Age-appropriate restraints and rear-seating positions work synergistically to provide the best protection in a crash.

(Durbin, Chen, Smith, Elliott, & Winston, 2005)

Restraint Use Among Families

- Comparison study of best practice recommendations vs. practice
- 275 drivers transporting 294 children with special health care needs
- 82% of drivers chose the appropriate type of restraint
- **Only 27% of restraints used properly**
- 24% of the seats inappropriately modified
- 19% of the children could have used additional positioning support during transportation
- Only 8% of medical equipment properly secured

(O'Neil, Yonkman, Talty, & Bull, 2009)

Concerns of Families

- Transfers in/out of vehicle perceived as "risky."
- Concerns regarding poor postural sitting positions.
- Concerns regarding lack of information/education.

(Falkmer & Gregersen, 2002)

Autism Spectrum Disorder

- Population: Children with ASD seen in children's hospital transportation clinic
- 74% escaped child safety restraint
- 20% demonstrated aggressive or self-injurious behavior during travel
- Affects not only safety of child, but others in the vehicle and on the road

(Yonkman, Lawler, Talty, O'Neil, & Bull, 2013)

TRANSPORTATION OPTIONS

Specialized Restraint Systems

Large Medical Seats

- **Who?**
 - Poor postural control (neuromuscular disorders, scoliosis, etc.)
 - Temporary orthopaedic conditions (casts, braces, etc.)
 - Behavioral concerns (escape artists)
- **What do they provide?**
 - Five-point harness to higher weight limits (typically 100+ lbs)
 - Additional positioning supports

Large Medical Seats

- **Other considerations?**
 - Large size of car seat (fit in vehicle, length of seat belt, etc.)
 - Growth of child
 - Transfer
 - Availability of tether anchor
- **Costs?**
 - \$1,000 – 3,500
 - Base cost vs. accessories

Merritt Manufacturing: Roosevelt



EZ Tether

Escape Artist Accessories (not pictured):

- Chest clip guard
- Buckle guard

Optional Positioning Accessories:

- Pommel
- Additional padding with scoliosis kit
- Incontinence Liner (not pictured)

Stay Put Headrest

Optional Scoliosis Kit

Low sides

Seat Depth Extenders:
3 options available

Forward-Facing

- 35 – 115 lbs
- 33.5 – 62 in

www.merrittcarseat.com

Inspired by Drive: IPS Car Seat 2000



Optional Positioning Accessories:

- Extensor thrust wedge
- Swing away abductor
- Buckle guard
- Retainer clip guard

Seat Depth Extenders:
2 options available

Adjustable head support

Lightweight
11 lbs

Forward-Facing

- 20 – 102 lbs
- Less than 60 in

www.inspiredbydrive.com

Inspired by Drive: Spirit Plus



Seat belt/tether system

Optional Positioning Accessories:

- Adjustable, swing-away trunk and hip supports
- Swing-away abductor
- Extensor thrust wedge
- Incontinence liner (not pictured)

Seat Depth Extender

Adjustable head support

Escape Artist Accessories:

- Chest clip guard
- Buckle guard

Low sides

Forward-Facing

- 25 – 130 lbs
- Up to 66 in

www.inspiredbydrive.com

Recaro Performance Sport Reha
Distributed by Thomashilfen

FAA Approved

Adjustable head support

Optional Tray Table (Not pictured)

Lateral trunk padding

Optional Accessories:

- Footrest with adapter (not pictured)
- Seat wedge (not pictured)

Forward-Facing

- 20 – 90 lbs
- 27 – 50 in

www.thomashilfen.us

Medical Booster Seats

- **Who?**
 - Need more support than what is provided by the vehicle seat belt alone
 - Have some head/trunk control
 - Developmental delays, achondroplasia, neuromuscular disorders, etc.
- **What do they provide?**
 - More support than a seat belt, less than a five-point harness
 - Age appropriate option

Medical Booster Seats

- **Other considerations?**
 - Require lap/shoulder belt
 - Availability of lower anchors and/or tether anchor
 - Behavior/maturity level of child
- **Costs?**
 - \$1,200 – 2,800
 - Base cost vs. accessories

Merritt Manufacturing Churchill



Compact & Lightweight

Optional Positioning Accessories:

- Foam abductor
- Hip inflection comfort pommel
- Hip inflection wedge

Low sides

Optional Stay Put Headrest

Positioning Vest

Booster Seat

- 65 – 175 lbs
- 48 – 72 in

www.merrittcarseat.com

Convaid Carrot 3 Special Needs Car Seat



Free angle recline

Optional positioning accessories:

- Positioning pillows
- Pommel (not pictured)
- Tray Table (not pictured)
- Footrest (not pictured)

Multiple seat depth and height extensions

Positioning harness

Booster Seat

- 30 – 108 lbs
- 37 – 60 in
- 3 – 15 years old

www.convaid.com

Convaid Carrot 3 Booster Seat



Free angle recline

Booster seat base

Low sides

Multiple seat height extensions

Positioning harness

Booster Seat

- 79 – 105 lbs
- 54 – 67 in

www.convaid.com

Recaro Monza Nova 2 Reha
Distributed by Thomashilfen

Adjustable head support

Optional Tray Table (Not pictured)

Optional Accessories:

- Seat depth extension (not pictured)
- Seat wedge (not pictured)
- Abduction block (not pictured)

Integrated MP-3 speakers

Lateral trunk supports

Optional Swivel Base with footrest adapter

Forward-Facing

- 33.1 – 110.2 lbs
- 37 – 59 in

www.thomashilfen.us

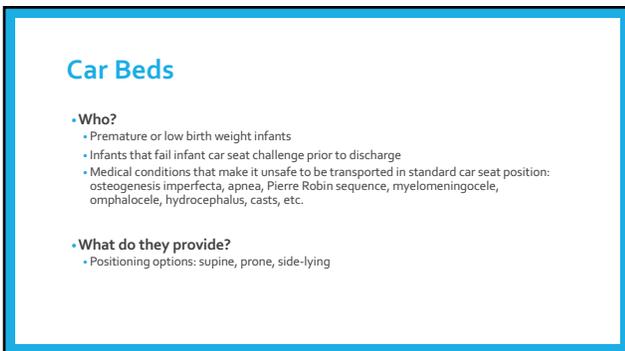
Vests

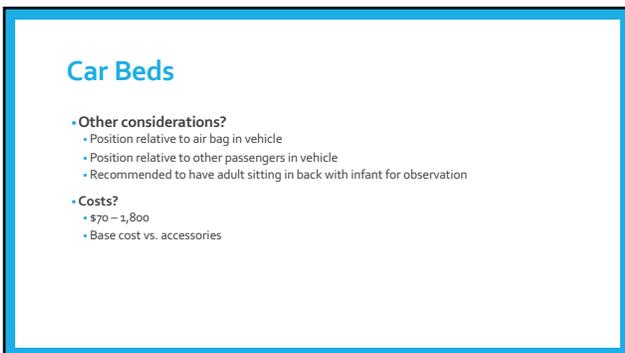
- **Who?**
 - Need more support than vehicle seat belt alone
 - Behavioral challenges
 - Unbuckle seatbelt or child restraint
 - Casts
 - Unable to be in sitting position
- **What do they provide?**
 - Zipper options
 - Ability to install without a seat belt (in some vehicles)
 - Age appropriate option
 - Lightweight

Vests

- **Other considerations?**
 - Availability of tether anchor
 - Behavior/maturity level of child
- **Costs?**
 - \$100 - 200
 - Base cost vs. accessories







Angel Ride Angel Guard

Positioning options:
• Supine
• Right-side
• Prone*



3-point harness

Narrow width
Installation with vehicle seat belt

Car Bed
• up to 9 lbs
• up to 23.5 in
www.angel-guard.com

Cosco DreamRide

Positioning options:
• Supine
• Prone*



Carry handle

3-point harness

Installation options:
• Seat belt
• Lower anchors

Car Bed
• 5 – 20 lbs
• 19 – 26 in
www.digusa.com

Merritt Manufacturing Hope

Positioning options:
• Supine
• Prone*
• Side-lying



Cummerbund:
Two sizes

Restraint bag:
Two sizes

Leveling straps

Leveling wedge
Not pictured

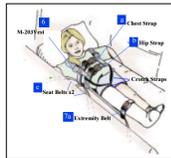
Car Bed
• 4.5 – 35 lbs
• up to 29 in**
www.merrittcarseat.com

Other Solutions

Who?

- Some situations require additional specialized consideration:
 - Spica casts/short term orthopedic conditions
 - Omphalocele
 - Ongoing postural support needs
 - Wheelchairs

E-Z On Modified Vest

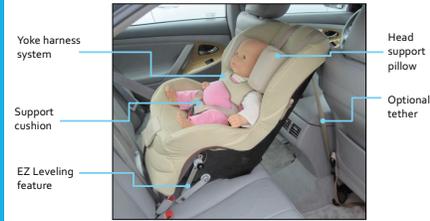


Vest

- 20 – 65 lbs (small)
- 20 – 100 lbs (large)

www.ezonpro.com

Merritt Manufacturing Jefferson



Rear-facing

- 7.5 – 40 lbs
- 48+ in

www.merrittcarseat.com

Merritt Manufacturing Chamberlain



Compact & Lightweight

Anti-Slouching Leg Strap Assembly

Optional EZ Up Headrest (Not pictured)

Positioning Vest
Three sizes

Positioning Device
• 81 – 225 lbs
• 48+ in
www.merrittcarseat.com

Transporting Children in Wheelchairs

- Transport safe wheelchair (WC-19) when possible.
- Secure wheelchair to vehicle (4-point system or docking system).
- Forward facing only.
- **Use vehicle lap/shoulder belt.**
- Do not use tray.
- Wheelchair backrest positioned 30 degrees or less to vertical.



(Rehabilitation Engineering Research Center on Wheelchair Transportation Safety, 2015)

TRANSPORTATION CLINICS

Evaluation & Services

Rehab Therapist Evaluation

- **Goal:** Provide safe transportation options through family centered care to improve quality of life
- **Evaluation:**
 - Subjective history (social, medical, family concerns, etc.)
 - Objective assessment (pain, behavior, posture, strength, ROM and functional mobility)
 - Vehicle assessment
 - Recommendations and trials
 - Ordering equipment
 - Fitting and caregiver education

Who attends a transportation clinic?

- Any child with medical diagnosis and transportation concerns
 - Some clinics may require a physician referral
- Common diagnoses:
 - Cerebral palsy
 - Spina bifida
 - Down syndrome
 - Autism spectrum disorder
 - Behavior disorder
 - Hydrocephalus

When to refer?

- **When conventional restraints are no longer an appropriate fit for the child**
- When child is over 40 pounds or weight has exceeded the limit of their 5 point harness and they still require the upper body support provided by a 5 point harness
- Significant spinal deformities that require custom positioning in car seat
- Behavioral safety concerns that are not met by conventional restraints

Funding

- Private insurance
- Medicaid programs
- Grants
- Philanthropic organizations
- Self-pay

Orthopaedic Loaner Programs

- Many hospitals have loaner programs to address temporary medical conditions.
- Available for children discharging in casts or other devices that will not allow for the use of conventional child restraints.
 - Ex: Hip or arm spica cast, halo
- Work with in-patient rehab teams.
- Educate surgeons on post-op car seat positioning needs.

CASE STUDIES

Client One

Considerations:

- Needs education on storage of oxygen/medical equipment
- Needs long term trunk support
- Parent wants forward-facing restraint

Client Profile:

- 3 year old female
- 36 lbs, 38 in
- Diagnosis: Angelman syndrome
- Travels with oxygen

Client One



Client One



Merritt Manufacturing Roosevelt

Client Two

Considerations:

- Ability of patient to assist with transfer
- Needs long term trunk/torso support
- History – has used a large medical seat in the past, caregiver indicates challenge with transfer

Client Profile:

- 10 year old male
- 75 lbs, 47 in
- Diagnosis: Cerebral Palsy

Client Two



Client Two



Merritt Manufacturing Churchill

Client Three

Considerations and Client Profile:

- Client Profile:
 - 6 year old male
 - 56 lbs, 44 in
 - Diagnoses: Down syndrome, autism
- Considerations:
 - Limited behavioral regulation
 - Single cab pick up truck
 - Unbuckles and interferes with driver

Before Picture:



Client Three



Client Three



EZ On 103Z with Floor Mount

What's next?

- Become a CPST. (<http://cert.safekids.org/>)
- Take the Safe Travel for All Children course. (www.preventinjury.org)
- Develop partnerships with local therapists.
 - Start small. Provide an inservice on child passenger safety.
- Develop partnerships with local DME or mobility specialists.
- Secure demos of specialized restraints to help with evaluations.
- Familiarize yourself with services providers for children with special needs in your community.
- **Ask families about transportation!**

Contact Us

- Missy Bryan, OTD, OTR/L, ATP, CPST
- Lecturer at Belmont University
- Occupational therapist at Monroe Carell Jr. Children's Hospital at Vanderbilt
- Missy.bryan@Belmont.edu
- Sarah Haverstick, CPST-I
- Safety Advocate
- Goodbaby International
- Sarah.Haverstick@evenflo.com

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