Getting Around Town: Securing You and Your Chair

NW Regional Spinal Cord Injury System forum
February 27, 2019

Susan Collins, CTRS/R; Elisa Smith, PT, DPT, NCS;
Julie Grant, OTR/L; Holly Wakefield, PT, DPT, NCS

Objectives

By the end of this forum, participants will be able to:

1. Identify two safe strategies to secure both occupied and unoccupied wheelchairs in a vehicle
2. Differentiate vehicle occupant restraints and wheelchair positioning components
3. State two of the risks of sitting in a wheelchair while in a vehicle

We ARE covering

- Ground transport
- Passenger transport
- General principles for consumers and therapists

We are NOT covering

- Plane or boat transport
- Adapted driving
- Vehicle modification
- Car transfers

Topics

- **Transportation safety**

- Riding IN (versus WITH) your wheelchair

- Considerations for mode of ground transportation

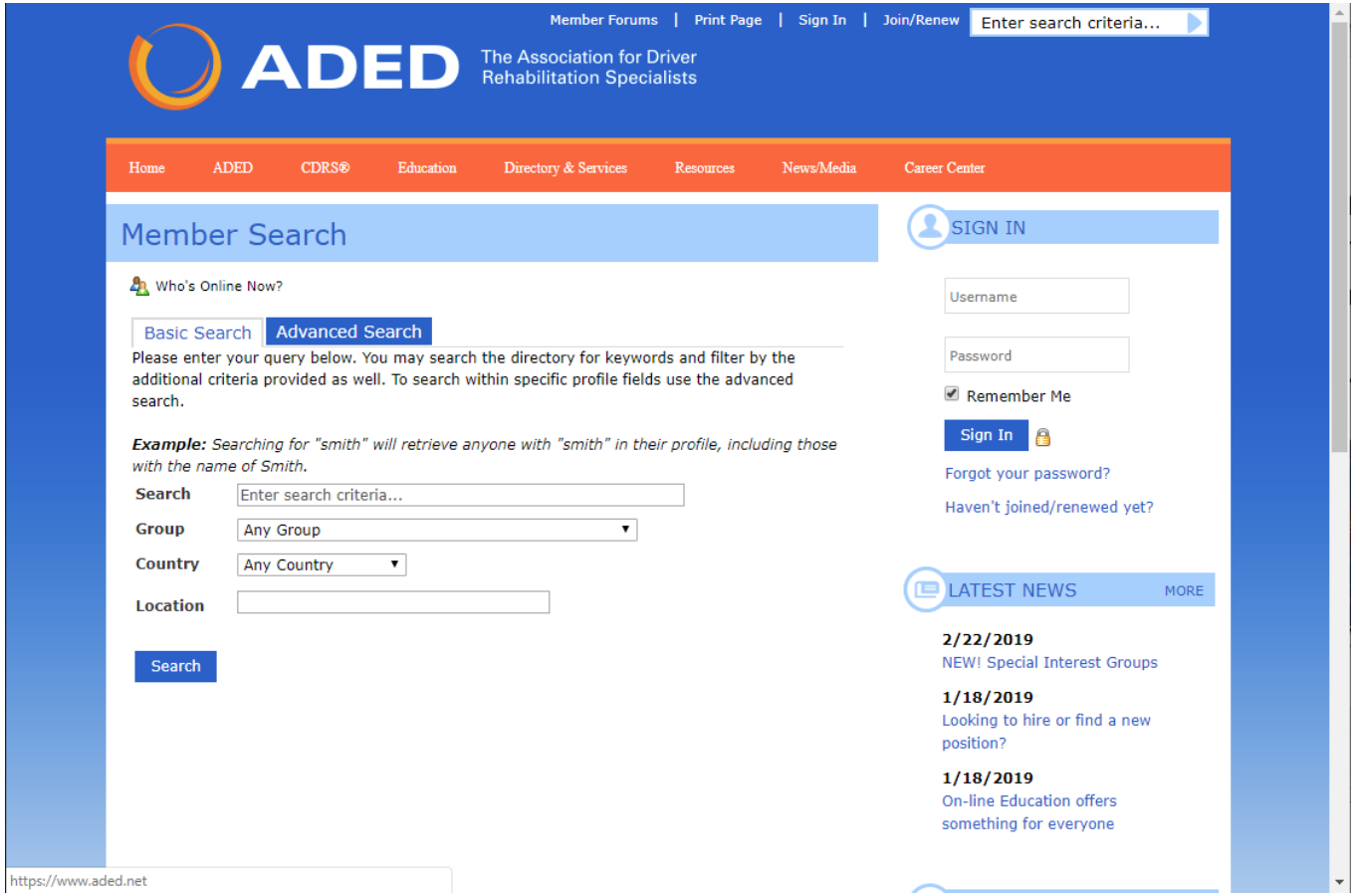
- Take home points

Who ***CAN*** help with adapted driving or vehicle modification?

Pick a **Certified Driver Rehabilitation Specialist.**

Find a specialist on the Association for Driver Rehabilitation Specialists search site:

https://www.aded.net/search/



Select a **vehicle dealership** within the **National Mobility Equipment Dealers Association**

Do your research….

Image: www.nmeda.com

Transportation Safety Guidelines

RESNA Rehabilitation Engineering and Assistive Technology Society of North America

RESNA Rehabilitation Engineering and Assistive Technology Society of North America

"In large transit vehicles, research has shown that individuals **riding seated in wheelchairs** are **45 TIMES** more likely to be injured in a crash than the typical passenger."

-RESNA's Position on Wheelchairs Used as Seats in Motor Vehicles

"People seated in wheelchairs are at significantly greater risk of serious injury or death in motor-vehicle crashes than are properly restrained occupants who are using the vehicle manufacturers' seats."

-RESNA's Position on Wheelchairs Used as Seats in Motor Vehicles

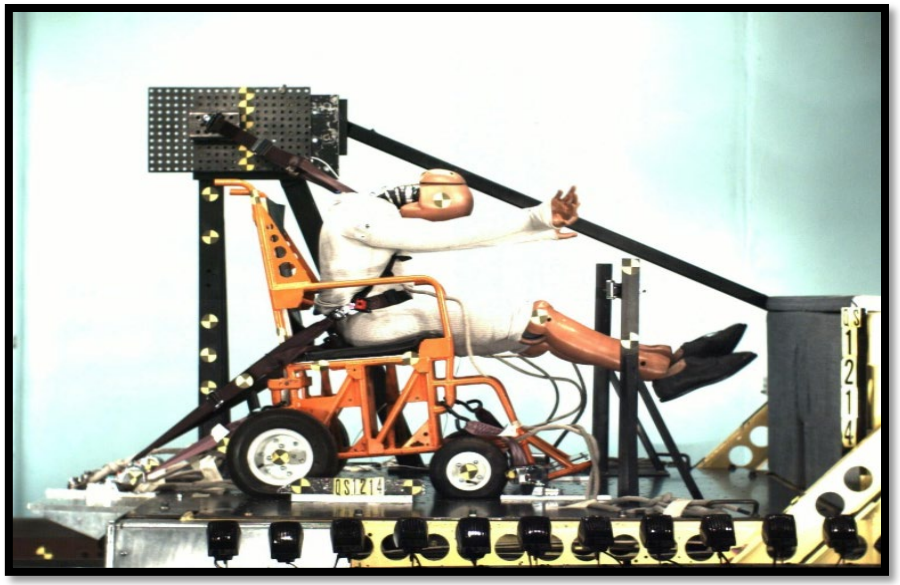


Image: Image: http://attridgetransportation.com/school_bus_photos

RESNA Wheelchair Standards on Wheelchairs and Transportation (WC19)

Crash testing primarily involves **wheelchair frames** and **bases**

- Test only one size and configuration per wheelchair model
- Excludes most components (backrests, straps, headrests, etc.)

RESNA's Position on Wheelchairs Used as Seats in Motor Vehicles

"There are no federal safety standards that apply to wheelchairs used as seats in vehicles, or to aftermarket wheelchair tiedown and occupant restraint systems (US Department of Transportation, 1999)."

RESNA's Position on Wheelchairs Used as Seats in Motor Vehicles

"In the absence of federal regulations, transportation safety experts have applied the principles of occupant protection to develop voluntary standards for wheelchair tiedown and occupant restraint systems (WTORS) and for wheelchairs designed for use as seats in motor vehicles."

Because **federal standards** are limited, follow BEST PRACTICE.

Topics

- Transportation Safety
- **Riding IN (versus WITH) your wheelchair**
- Considerations for mode of ground transportation
- Take home points

If riding **in a wheelchair** during transport is **dangerous but common**, what should rehab therapists do?

Rehab therapists (PT, OT, TR)

- Understand best practice in ground transport
- Be familiar with seating and positioning needs
- Teach transfer training skills
- Educate!
- Advocate

Key terms:

1. Wheelchair securement

1. Occupant restraint

1. Positioning device

Critical Components

WHEELCHAIR

Frame / Base design

Securement System*

PASSENGER

Occupant restraint

Postural support

**when riding IN your wheelchair, or transporting an assembled unoccupied wheelchair*

Riding **WITH** your wheelchair

PROS	CONS
Safety	Requires a transfer
Cost	Limited seating and postural support

Riding **IN** your wheelchair

PROS	CONS
Fewer transfers	Dangerous
Positioning supports	Expensive

Riders often stay in wheelchairs because transfers are difficult

- **Transfer coaching** with a skilled specialized PT/OT
- **Transfer equipment** vehicle modifications with a certified driver rehab specialist and an NMEDA dealership

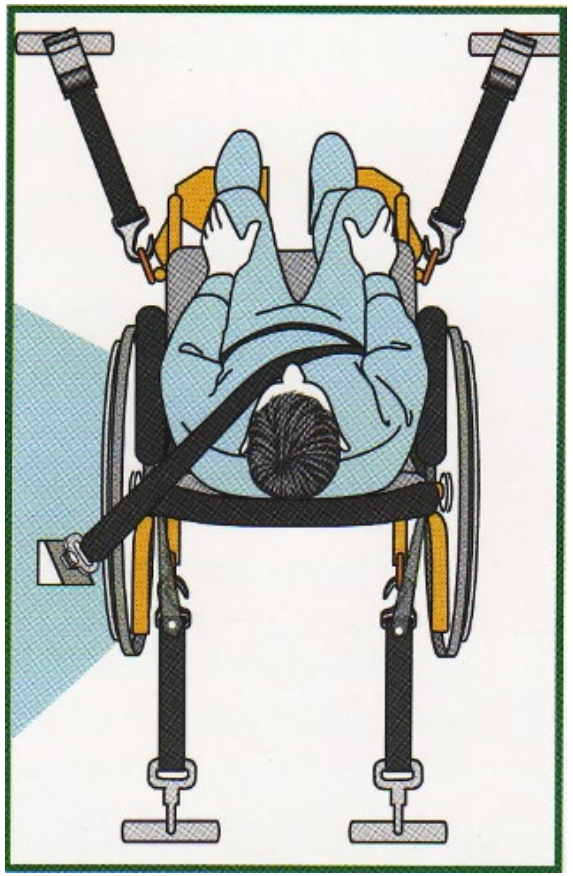
Wheelchair Securement

To secure an **occupied wheelchair**

- Consider selecting a WC19 Crash tested frame/base
- Need transport brackets **OR** clearly identified safe securement points
- Tether straps may come in handy

Securement systems

4-Point Strap System



Docking System

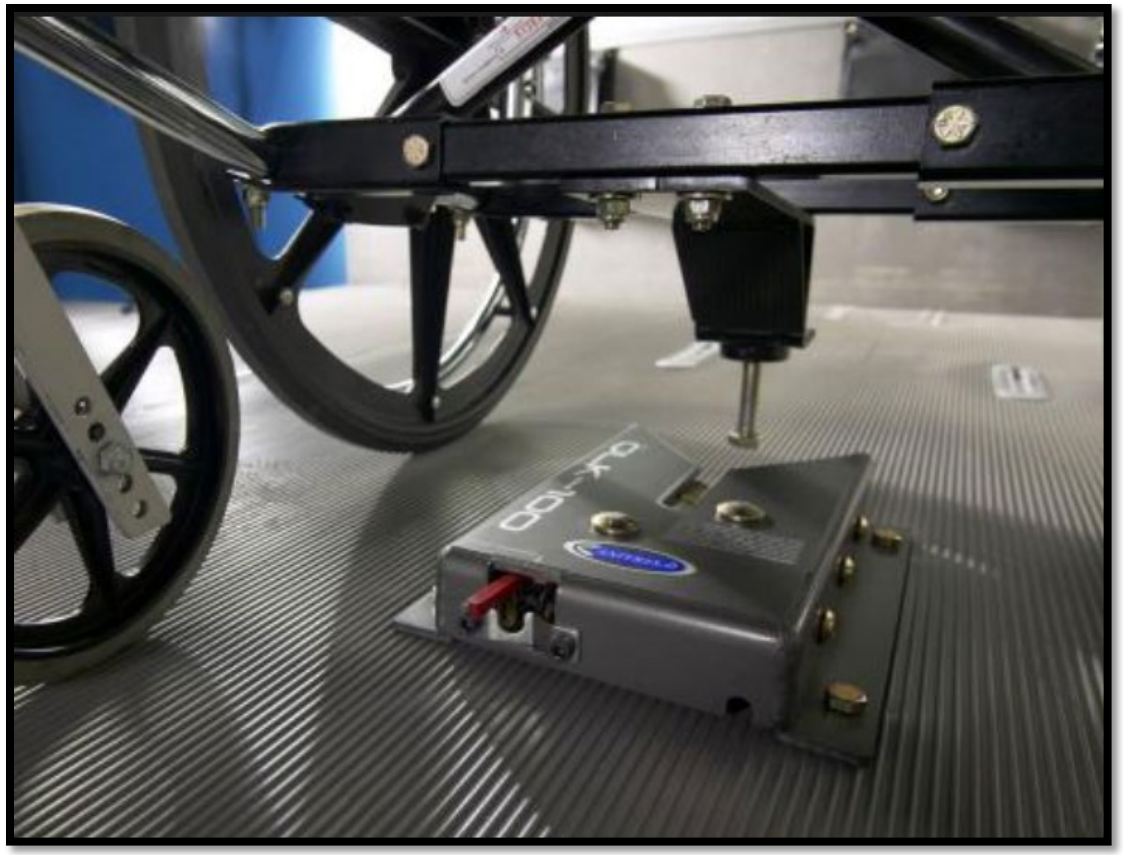
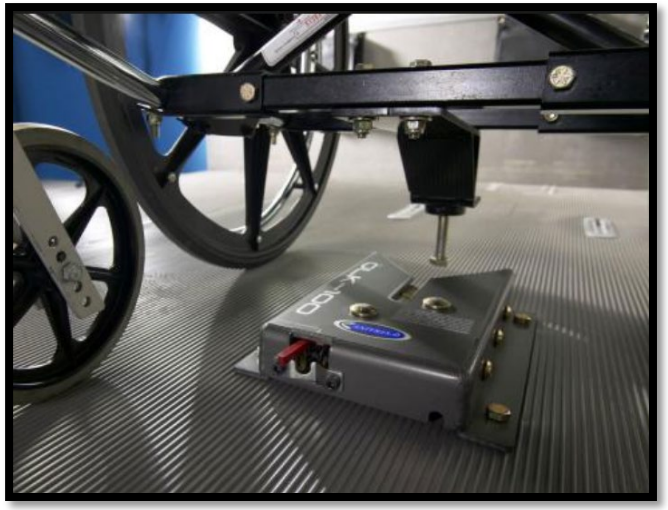


Image: http://www.rercwts.org/RERC_WTS2_KT/RERC_WTS2_KT_Stand/RERC_WTS2_19_Chart.html and Image: https://www.ridc.org.uk/content/wheelchairs-wavs

Docking system securement



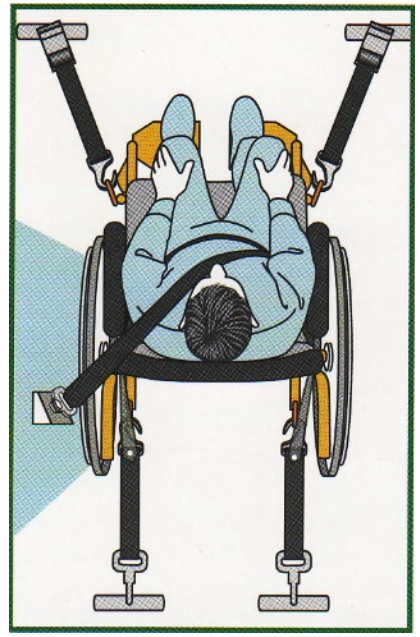
Pros

1. Efficient
2. User independence

Cons

1. HEAVY on ultralights
2. Reduces wheelchair ground clearance
3. Expensive
4. Compatible vehicle and wheelchair needed

4-point strap securement

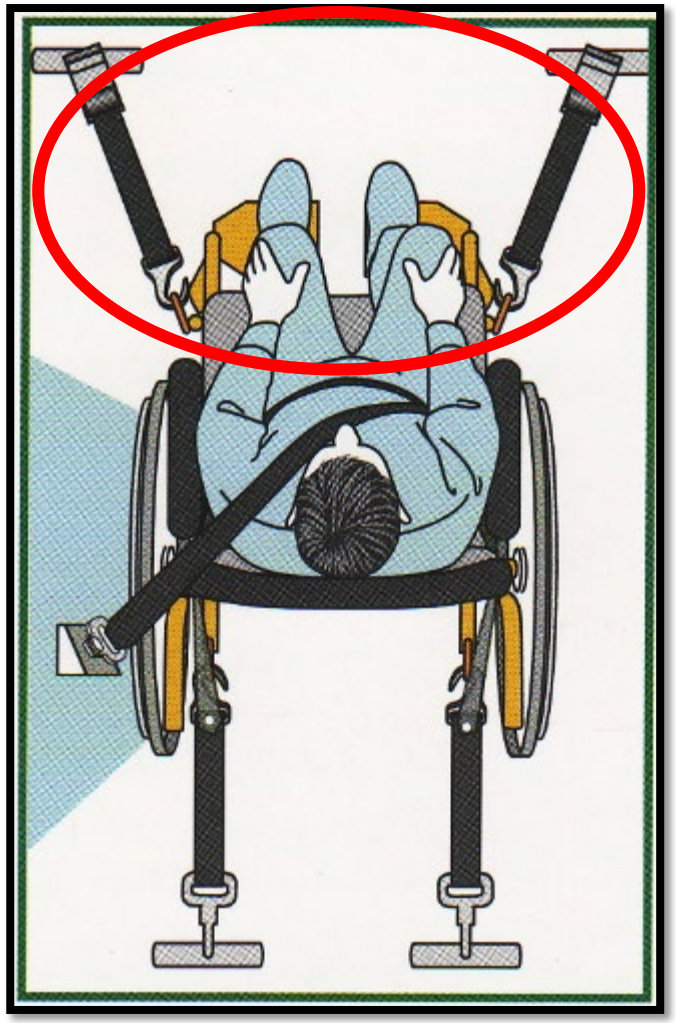


Pros

1. Compatible with most wheelchairs
2. Light
3. Cheap

Cons

1. Time-consuming
2. Caregiver usually required
3. Physically demanding
4. Easy to lose parts or use incorrectly



Front straps

- Keep the wheelchair from rotating
- Lateral and forward
- Transverse plane: 45º

Image: http://www.rercwts.org/RERC_WTS2_KT/RERC_WTS2_19_Chart.html

Back straps

- Keep the wheelchair from pulling forward
- Straight back
- Sagittal plane: ≤ 45°

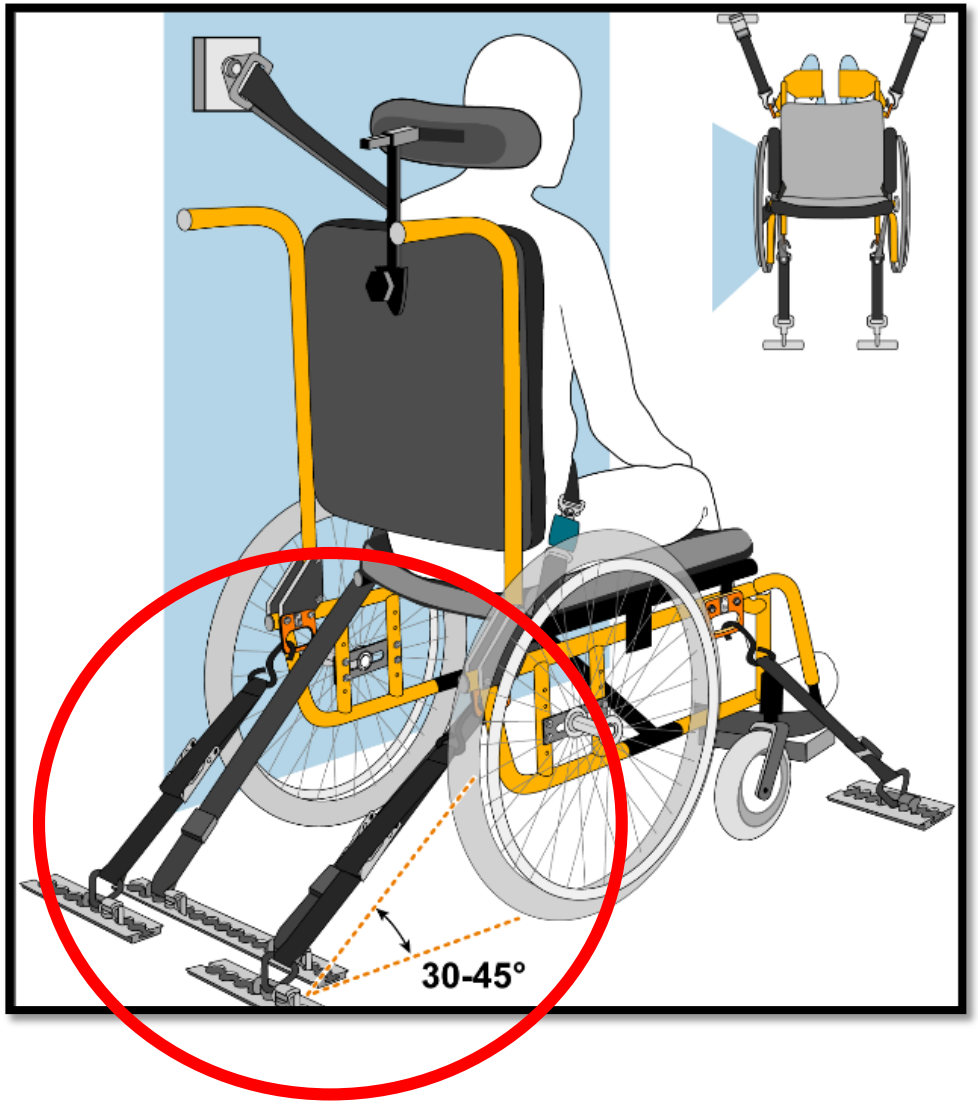


Image: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0186829

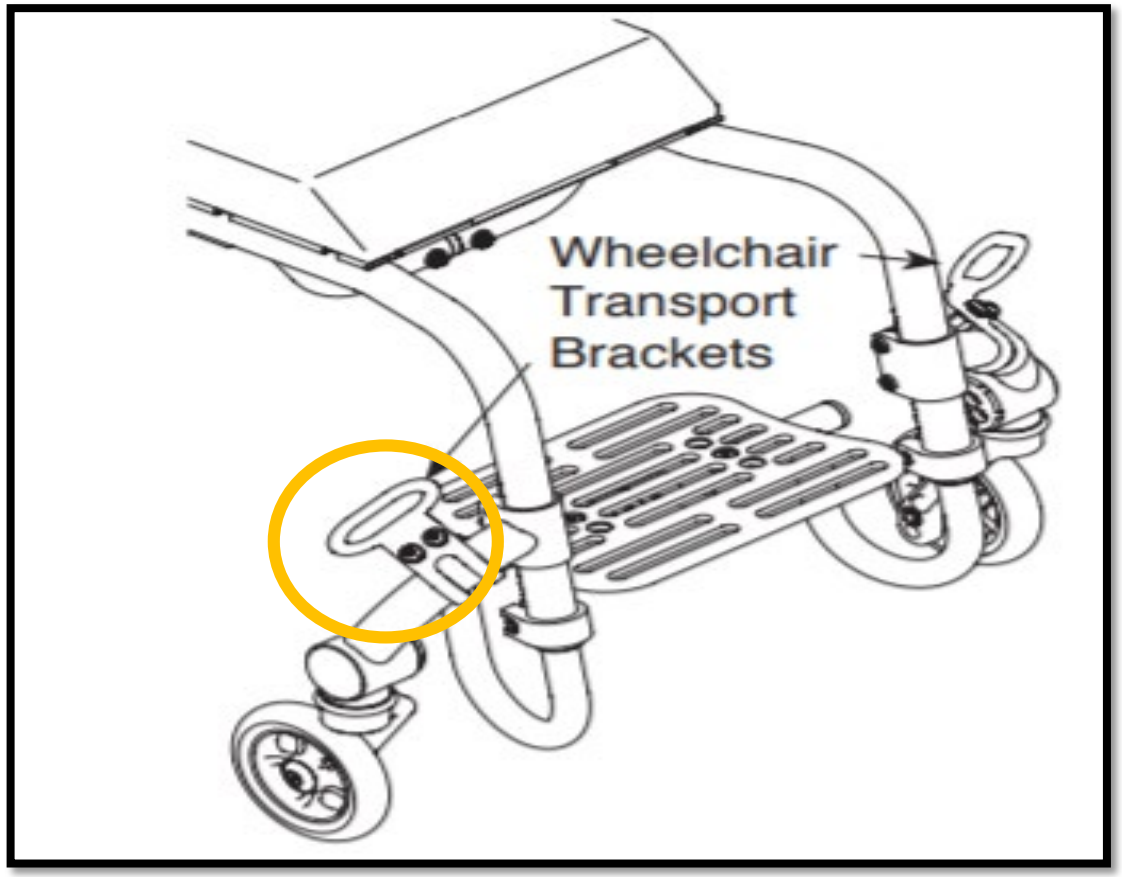
TETHER STRAPS from an NMEDA dealership

MARK securement points on the frame or base

Cross D. Mobility device securement: standards and wheelchair marking and tether strap program.
Image: http://www.dot.state.oh.us/Divisions/Planning/Transit/Documents/Programs/Training/Cross_WC_StdsMarkingTether_R6_APTA_Oct2011.pdf

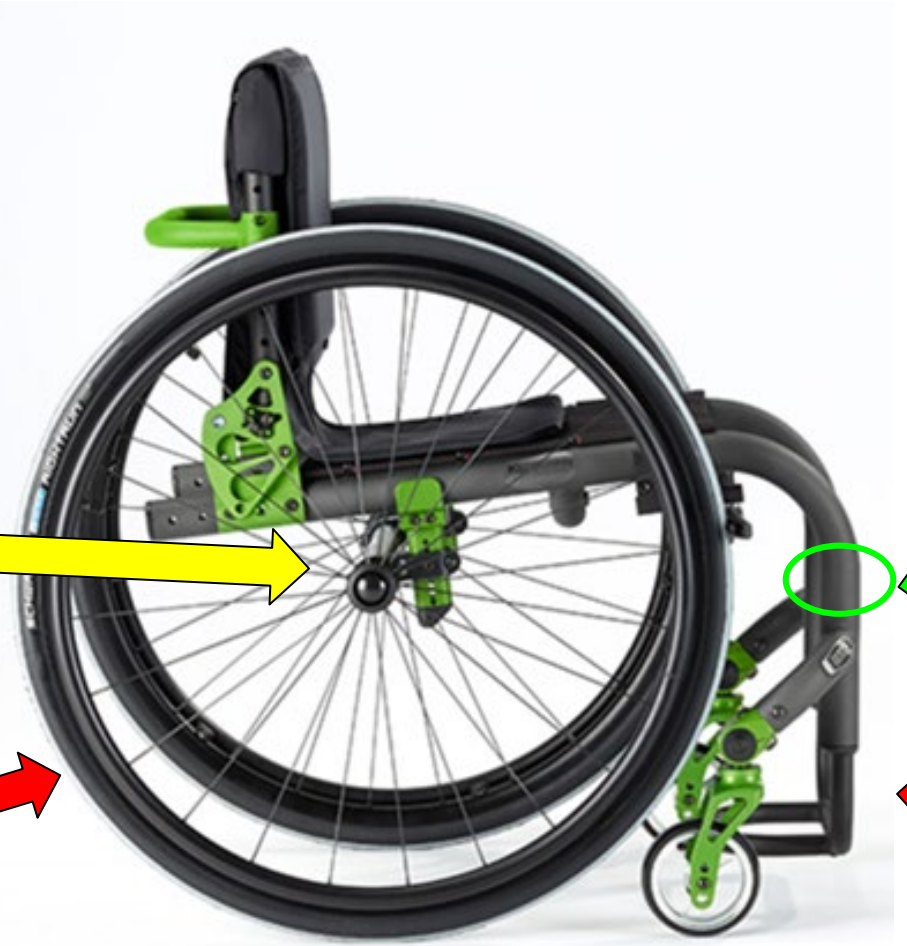
Wheelchair frame and base designs

Transport Brackets	Safe Securement Points



Images: https://permobilus.com/products/manual-wheelchairs-by-tilite/, https://permobilus.com/wp-content/uploads/2016/12/TWIST_Transport_Brackets.pdf

Securement locations: mono-tube frame



Camber tube may be your “best” option

Above caster wing

Wheels **not** safe

Footplate **not** safe

Image: https://www.kimobility.com/Product.action?productName=Rogue

Securement locations: dual-tube frame

Avoid wheels or camber tube

Lower tube of frame

Welded connection

Footplate **not** safe

Images: https://permobilus.com/product/aero-t/

Images: https://permobilus.com/products/power-wheelchairs-by-permobil/mid-wheel-drive/ and https://permobilus.com/product/m5-corpus/

Unoccupied assembled wheelchairs should be secured too…

Image: http://bdindependence.com/products/uwr/

Tips from Melissa at UW Driver Rehab: Stowing disassembled wheelchairs

- Front passenger seat with passenger belt/belt extender
- Back seat and floor
- Vehicle trunk
- Wheelchair lift

-

Image: https://www.youtube.com/watch?v=b7biVXVemdU

Occupant Restraint

Occupant Restraint

- **Adults:** 3-point occupant restraint
- **Small children:** 5-point occupant restraint and a car seat

https://www.nhtsa.gov/equipment/car-seats-and-booster-seats

Three point occupant restraint

Crash-tested vehicle lap and shoulder belt

- Shoulder belt contacts collar bone and breast bone
- Lap belt contacts pelvis, not the abdomen

Image: http://wc-transportation-safety.umtri.umich.edu/consumers/how-safe-is-your-wheelchair

Need an occupant restraint system **EVEN** if the wheelchair has a wheelchair lap or pelvic belt, unless it is a crash-tested wheelchair lap belt.

Keep belts away from the abdomen to avoid harm in a crash.

Image from BodyPoint: https://bodypoint.com/ECommerce/category/pelvic-positioning/hip-belts

Occupant restraints work best in an UPRIGHT position.

Image: https://window.brenau.edu/featured/best-teachers/

Do **NOT** strap over the wheelchair wheels, side guards, armrests, or other parts

Image: http://wc-transportation-safety.umtri.umich.edu/safety-tips-handouts.

Wheelchair users often must DIRECT the driver to PROPERLY secure the wheelchair **AND** fasten the occupant restraints.

Image: https://www.qstraint.com/quantum/

And the driver may incorrectly **ASSUME** the wheelchair user's companion or caregiver will do everything.

To transport children **out of their wheelchairs**, consult with a Child Passenger Safety Technician and a knowledgeable PT/OT.

This includes in school buses and personal vehicles whenever possible!

AUTOMOTIVE SAFETY PROGRAM
Indiana University School of Medicine

Positioning Device

Riding WITH your wheelchair

Wheelchair users may need **seating and positioning devices**

Image: https://gettecla.com/

Positioning devices **HELP** (Karg et al)

- Protect airway, ability to swallow, skin, and joints
- Avoid loss of balance or falls
- Facilitates upright posture to maximize occupant restraint efficacy

Positioning devices may **HARM** (Karg et al)

- Blunt impact
- Become projectiles
- Interfere with the occupant restraint belts

Upright positioning vests

- For *kids and adults*
- Weight limit: 31 to 225 lb
- Torso but not head/neck support
- Use with occupant restraint belts

Image: http://www.merrittcarseat.com/chamberlaincarseat/

Off-label choices

- Wheelchair straps
- Weight-lifting wraps
- Race car bucket seats
- Cushions

Large medical car seats

- Weight limit: 80-130 lb
- Extra positioning

Adaptive booster seats

- Weight limit: 108-205 lb
- Extra positioning and easy swap between vehicles

Image: https://tadpoleadaptive.com/car-seats-transportation/car-seats-and-bosters/convaid-carrot-special-needs-booster.html

When riding **IN** your wheelchair...

People need head and back support when vehicles stop or crash.

TALL backrests are the *norm* on powerchairs

Image from *The TSF*. https://www.thetsf.org/

BUT, wheelchair backrests are not crash-tested.

SHORT backrests are crucial on most ultralight wheelchairs.

Image: https://www.verywellhealth.com/how-to-determine-proper-fit-in-a-wheelchair-2318275

Headrests (Karg et al)

- Essential at rest or during tilt backs for some users

- If set up 1” behind head, MIGHT decrease whiplash.

Image from Stealth Products: https://stealthproducts.com/splash/drivecontrols/

- But headrests are NOT crash-tested
- Heavy hardware
- Securing the head or neck to the wheelchair is DANGEROUS
  - Soft collars
  - Secure the pelvis and torso

Image from MediFab: https://www.medifab.com.au/products/wheelchair-seating/savant-head-support-system

Consider vehicle-based head and back support product options

Image: http://www.newmobility.com/2016/11/accessible-vehicle-accessories/

Chest Harnesses (Karg et al)

- Non-negotiable for some riders
- Stabilize during quick stops and turns
- **NOT** crash-tested
- **Strangle risk** - ensure pelvic belt is secure

Image: https://mobilitymgmt.com/Articles/2011/10/01/Industry-Anniversaries.aspx

Topics

- Safe Transportation
- Riding IN versus WITH your wheelchair
- **Considerations for mode of ground transportation**
- Take home points

Mode of transportation

- Personal vehicles
- Public bus
- Train
- School bus
- Cabs and rideshares

Personal vehicles

- Driver versus passenger
- Level of independence
- Riding IN versus WITH the wheelchair
- Vehicle make, model, and modifications

Image: http://www.newmobility.com/2016/02/motorsports-with-hand-controls/

Public buses

- Wheelchair securement required- driver can help
- Public buses must have a ramp or lift and be wheelchair accessible
- Sign up for free county transit instruction programs

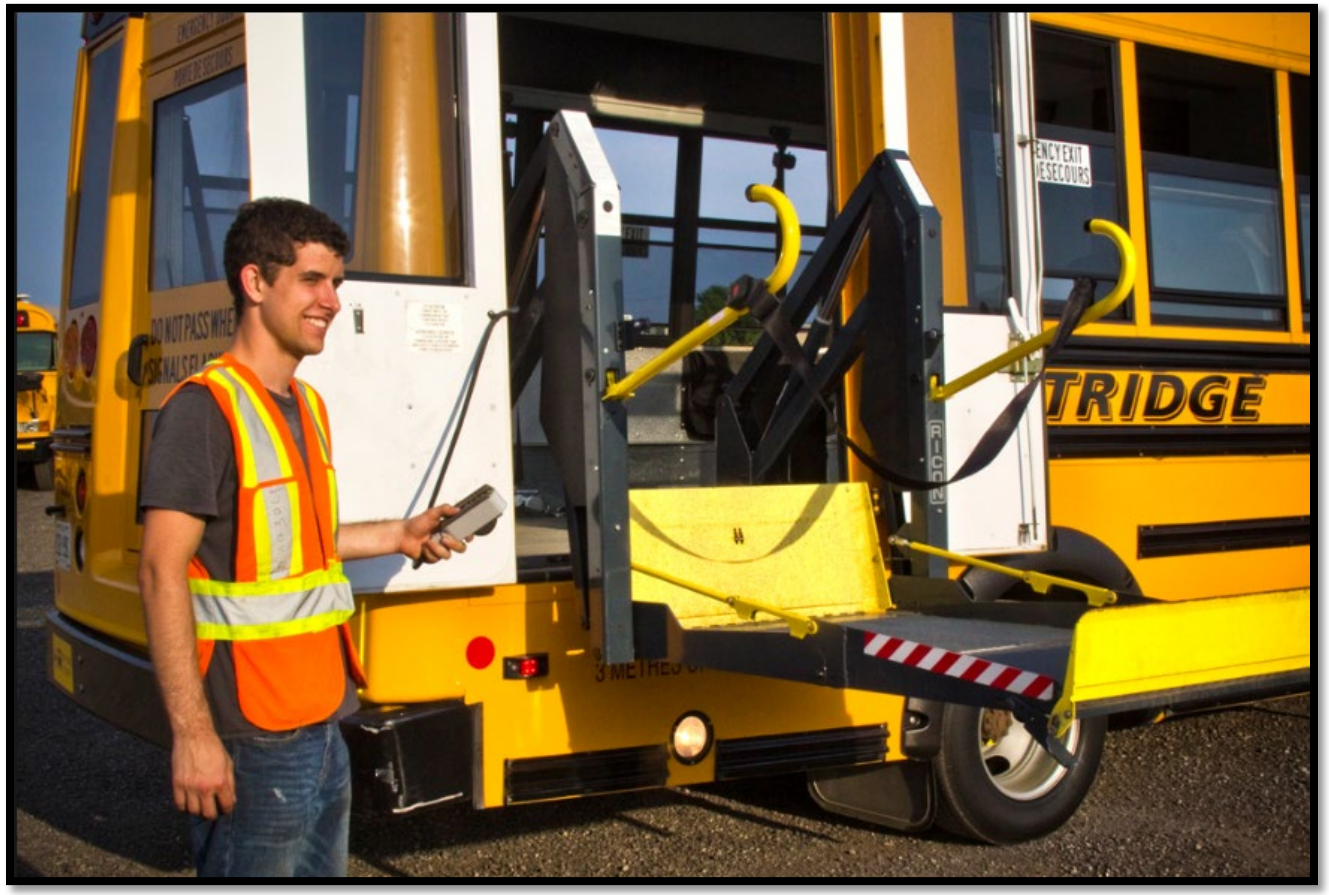
Trains

- Wheelchair securement and occupant restraint usually NOT required

- Managing ramps, gaps, thresholds

Image: http://www.metro-magazine.com/management-operations/article/713293/how-to-involve-seniors-people-with-disabilities-to-make-your-transit-system-more

School buses



- Inconsistent standards/rules between districts
- Advocate and collaborate
- If riding in wheelchair, ensure WC19 compliance
- Consider transferring into bus seat if seat belts available.

Image: http://attridgetransportation.com/school_bus_photos

Accessible cabs and rideshares

- Drivers are specially trained in wheelchair transport
- Limited height clearance
- Accessible ride share programs not available in all regions
- Can be challenging to find accessible options in apps

Image: http://wheelchairtraveling.com/accessible-taxi-cabs-in-seattle/

Topics

- Transportation safety
- Riding IN (versus WITH) your wheelchair
- Considerations for mode of ground transportation
- **Take home points**

Take home points

- **Know** wheelchair securement and occupant restraint guidelines
- **Consider** tether straps
- **Mark** your securement points

Take home points

- Wheelchair parts should **not interfere** with occupant restraint belts

- Wheelchair positioning and mobility needs **sometimes are in conflict** with wheelchair transport safety needs

The big picture

- Secure your wheelchair
- Secure yourself
- Sit in the vehicle seat if possible

Resources

1. **University of Michigan's Transportation Research Institute,** http://wc-transportation-safety.umtri.umich.edu/knowledge-translation
2. **University of Washington Medical Center's Driver Rehabilitation Program,** 206-598-1805
3. **NMEDA dealerships,** http://www.nmeda.com/locate-dealer/
4. **Child Passenger Safety Technicians**, https://cert.safekids.org/
5. **Indiana University School of Medicine Automotive Safety Program,** https://preventinjury.pediatrics.iu.edu/special-needs/

References

1. American Academy of Pediatrics. Policy statement: Child passenger safety. *Pediatrics*. 2011;127:788-793.
2. Buning ME. Wheelchairs and Transportation. In: Lange ML, Minkel JL, ed. *Seating and Wheeled Mobility: A Clinical Resource Guide*. Thorofare, NJ. SLACK Inc;2018:385-395.
3. Buning ME, Bertocci G, Schneider LW, Manary M, Karg P, Brown D, Johnson S. *RESNA's position on wheelchairs used as seats in motor vehicles. Assist Technol. 2012;24:132-141.*
4. Karg P, Cotzin B, Manary M, Fuhrman SI. *Guidelines for Use of Secondary Postural Support Devices by Wheelchair Users During Travel in Motor Vehicles. J Pediatr Rehabil Med*. 2011;4:251-257.
5. Lawler B, Novak L, Talty J, Yonkman J. Safely transporting children on the go with special health care needs. *OT Practice*. 2013;8-13. https://preventinjury.pediatrics.iu.edu/wp-content/uploads/2019/01/onthegoOTpractice.pdf
6. Ride Safe Brochure. https://docs.google.com/viewer?a=v&pid=sites&srcid=dW1pY2guZWR1fHdjLXRyYW5zcG9ydGF0aW9uLXNhZmV0eXxneDoyYjBjOGMxYmM1M2RkNTNm
7. Schneider and Manary MA. *The Dos and Don'ts of Wheelchair Transport Safety.* http://www.schoolbusfleet.com/article/611464/the-dos-and-donts-of-wheelchair-transport-safety Accessed 02/14/2019
8. Transportation safety tips for professionals involved with prescribing and/or providing wheelchairs. *Wheelchair Transportation Safety*. University of Michigan Transportation Research Institute. Available at: http://wc-transportation-safety.umtri.umich.edu/safety-tips-handouts. Accessed 12/28/18.
9. MobilityDeviceSecurement:StandardsandWheelchairMarking&TetherStrapPrograms.
10. http://www.dot.state.oh.us/Divisions/Planning/Transit/Documents/Programs/Training/Cross_WC_StdsMarkingTether_R6_APTA_Oct2011.pdf Accessed 2/14/19.

Questions?