Empowering Individuals Who Use Wheelchairs to Ensure Safe and Dignified Transportation
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Objectives
1. Identify at least 3 state and federal laws, voluntary rules, and regulations and guidelines, that influence decision making for transportation of individuals using wheelchairs.
2. List at least 3 wheelchair features and accessories, and 2 vehicle features and securement methods that promote safe transportation.
3. Identify at least 3 potential barriers and 3 potential facilitators of safe transportation through investigation of current research, and develop potential solutions that could be included in a comprehensive education plan designed to promote safe transportation.

Disclosure
Nothing to Disclose
No Financial Gain
Travel

- Is "an inseparable part of our daily lives"
- Contributes to physical and mental health
- Involves choices: When, Where, Why, How?
- Allows us to meet daily needs/societal obligations

(Waara, 2001)

Travel for Individuals in Wheelchairs

- Limited transportation access/options
  - May impact
  - Physical/Psychological Health
  - Independence
  - Social Relationships

(Waara, 2001)

Federal Protection

- PRIMARILY ABOUT ACCESS AND SPACE
  - IDEA
  - Education Law
  - Transportation-Related Service
  - ADA
  - Civil Rights Law
ADA provides for SPACE

RESULT...

- More individuals riding in wheelchairs
  - Unable to access vehicle seat and belt combination (if present)
  - Unequal protection

(Karg et al., 2009)

Wheelchairs are NOT designed for Transportation

- Designed for MOBILITY not stability
- Design can impact safety

(Karg et al., 2009)
Federal Protection

- **FMVSS 222** - School Bus Passenger Seating and Crash Protection
  - Effective 1977
    - Provides occupant protection requirements for:
      - Seating positions / Restraining barriers
  
- **FMVSS 222**
  - Modified to include wheelchairs in 1994
    - Wheelchair and passenger securement
      - Forward facing position
        - Requires tie down/occupant restraint but DOES NOT require use

**FMVSS 222**

- Requires a 7 point system
  - Tie Down (4) AND Lap shoulder belt (3)

*pictures with permission from UMTRI travelsafer.org*
Wheelchairs

- **NO** Federal legislation for:
  - USE of space or tie downs/seat belt
  - CRASH TESTING

SEAT BELT LAWS?

- Federal Law
  - Required to **HAVE** on Vehicles (1968)
- Each state determines individual laws for USE:
  - Child passenger seats
  - Seat belts

STATE LAWS?

- State Laws
  - Seat Belts
  - Exceptions for disabilities
  - Wheelchairs?
Securement Guidelines

- Began in 1980s/ Published 1996
- Society of Automotive Engineers (SAE)
- Developed Recommended Practice J2249
  Wheelchair Tiedowns and Occupant Restraint Systems

(Monary 2010; Karg et al., 2009)

RESNA
Rehabilitation Engineering and Assistive Technology Society of North America

- Voluntary Standards for Crash Testing of:
  - Wheelchair Restraint Systems (WC 18)
  - Wheelchairs (WC 19)
  - Wheelchair Seating Systems (WC 20)

www.resna.org

WC 18, WC 19, WC 20

- Addresses minimum standard for:
  - Design
  - Performance
  - Testing/Use

www.resna.org
**WC 18**

- Securement (Wheelchair Tie Down-WT)
  - Two types
  - 4 tie down straps (two front, two back)
  - Docking systems

*Picture with permission from UMTRI*

[www.resna.org](http://www.resna.org)

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**WC 18**

**Occupant Restraint (ORS)**

- Lap/Shoulder Belt
- Lap Anchored Belt testing requirement (new)

*(picture with permission from UMTRI)*

[www.resna.org](http://www.resna.org)

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**WC 19**

**Addresses Different:**

- Types of Wheelchairs
  - Manual and Power
- Methods of Transportation
  - Public/Private (Car, Bus, Van)

[www.resna.org](http://www.resna.org)
Clearly Marked Anchor Points

WC 20
Tests Seating Systems
- Back, Seat, and Attachment Hardware
Uses a surrogate frame
- Meets WC 19 standards
- Has attachment points

www.resna.org

RIDE SAFE BROCHURE
Crash Test

http://wc-transportation-safety.umtri.umich.edu/videos

University of Michigan Transportation Research Institution

Crash Test

Video Time!

Crash Test Products

http://wc-transportation-safety.umtri.umich.edu/crash-tested-product-lists

Find information for crash testing for:

- Wheelchairs
- Tie Down and Occupant Restraint Systems
- Seating Systems
Crash Tested Products

Crash Tested Product Lists

The following pages list products available on the market that manufacturers have reported as being successfully crash tested and/or fully compliant with associated FMVSS and/or SAE standards. Use this list to the manufacturer websites to learn more about the listed mobility products or to contact the person accountable for implementing the standards.

Wheelchairs
Wheelchair Seating Systems
Wheelchair Tiedown and Occupant Restraint Systems (WTORS)


Secondary Supports

- Commonly Prescribed for Wheelchairs
- NOT CRASH TESTED
- Even under voluntary standards
  - New exceptions
- Consider what is used and WHY?

(Karg et al., 2011)
Secondary Supports-Benefits

- Contacts Body Directly
  - Decrease injury
  - Provide positioning safety
  - Address medical needs
  - Airway clearance (Karg et al., 2011)

Secondary Supports-Risks

- Contacts Body Directly
  - Can cause injury to body (internal organs)
  - Risk for Dislodgment
  - May restrict proper Lap Shoulder Belt Placement (Karg et al., 2011)

WC 19 Revision

- On Rating System must achieve
  
  **Scores:** Excellent, Good, Acceptable
  
  Two ratings:
  1. Ease of applying lap/shoulder belt
  2. Ability to achieve good fit

www.resna.org
WC 19 Revision

• Option for wheelchair anchored lap belt
• Anchor points for a wheelchair-anchored pelvic belt
• Provide a standard interface on the pelvic belt to connect to a vehicle-anchored shoulder belt

www.resna.org

Newest WC 19 Requirements

• Expanded standards for 25-50 pounds
• Designed to mimic car seat requirements (FMVSS 213)
  • High back/head rest
  • Crash worthy 5 point harness

www.resna.org

PROVIDING TRANSPORTATION

• Decision Making by Team
• Who Should Be on the Team?
Our Team

- Patients/Families
- Therapists/Physicians/Nurses
- Rehab Specialists/ATP/Vendors/Medical Suppliers
- Bus Drivers/School Administrators/Teachers
- Child Passenger Safety Technicians
- Insurance Companies
- Engineers
- Manufacturers (Burning et al. 2012)

Team

- Recognize role at All Levels
- Use Holistic Approach
- Consider individual in wheelchair

(TRADITIONAL ROLE of Rehabilitation Professionals)

- Help individuals with disabilities to receive wheelchairs

(Riley Hospital for Children)
EXPANDED ROLE of Rehabilitation Professionals

- Help individuals with disabilities to achieve safe TRANSPORTATION

(Riley Hospital for Children)

Wheelchair or Vehicle Seat?

- Transfer to vehicle seat typically best
- But NOT always...
- Considerations:
  - Safety of Seat
  - Risk of Transfer
  - Postural/Positional Needs/Medical Needs

Wheelchair Transportation

- Transfer onto a vehicle seat if able - safest!
- If not use transit ready or transit compatible wheelchairs
- Consider different needs for different vehicles
- School bus vs. Private Vehicle

(Riley Hospital for Children)
Barriers to Safe Transportation

- Lack of knowledge/skills/training
- Lack of access to appropriate and safe equipment
- Lack of support and access to resources
- Misuse of equipment

Securement Misuse

- Crash Investigation (39 crashes/42 individuals)
- University of Michigan Transportation Research Institute (UMTRI)
  - 34/42 properly secured tie downs/docking
  - 12/42 properly secured lap/shoulder belt
  - 26/42 sustained moderate/severe injuries
    - 10/26 were fatalities

(Schneider et al., 2010)

Securement-Misuse

- Observational Study - private vehicles (exiting garage)
  - 20 children with special needs in Wheelchairs
    - 90% used tie down systems
    - 20% used lap shoulder belt
    - 6/20 positioning belts only as protection

(Yonkman et al., 2010)
CONCLUSION

Lack of lap shoulder belt use:
- Poor
- Training (caregivers, drivers)
- Vehicle Anchored Belt Fit
- Wheelchair Design

(Schneider et al., 2010)

Lack of Knowledge
- 107 individuals who used wheelchairs/87 Care Providers
- Knowledge of “transit wheelchair” “transit option”
  - 18% of users of wheelchair /20% of care providers
- Knowledge of WC 19 Standards
  - <1% of users of wheelchairs/ 7% of care providers

(Brinkey et al., 2009)

Barriers to Safe Transportation
- Physical limitations/impairments (individuals, caregivers/providers)
- Lack of funding
- Poor motivation
- Lack for cooperation/collaboration
Wheelchair vs Carseat

- Parental Reported Reasons for choosing a Wheelchair
- Child Characteristics/Factors
  - Weight/size
  - Poor muscle control
  - Orthopedic deformity
  - Wheelchair difficult to lift/store
  - Caregiver injury/difficult transfer

(Yankman et al., 2010)

Solutions

- Educate
  - Yourselves, Individuals, Families, Providers, Community Agencies
- Collaborate
- Refer
- Advocate

“Consumers should expect...”

- "...rehabilitation professionals will
  - be knowledgeable about best practices in transportation safety
  - discuss and include transportation safety issues in their evaluations, and, when needed, recommend a suitable wheelchair."

(Burning et al., 2012)
Resources

- UMTRI website
- Professional Organizations
  - RESNA
  - National Mobility Equipment Dealers Association (NMEDA)
  - APTA/AOTA
  - NHTSA

Questions

Contact

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References