In this edition we discuss the complex issue of travelling in a wheelchair in a motor vehicle. There are many factors that need to be taken into account when deciding to use a wheelchair as a seat for travel in a vehicle. These need to be considered carefully in order to ensure that the occupant and other vehicle occupants are as safe as possible in the event of an accident or near miss.

These considerations should be discussed at the point of wheelchair prescription to ensure that the most appropriate wheelchair and fittings are prescribed that meet the client’s mobility and postural needs, as well as complying with standards for transport. The information in this edition is taken from Australian Standards, current research and best practice guidelines based on clinical experience. We suggest a thorough risk assessment when deciding to use a wheelchair as a seat in a vehicle and if in doubt contact experts such as TranSPOT.

Safe travels,
Liza

Editorial

Main Story: Considerations for vehicle travel in a wheelchair

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When travelling in a car, it is recommended, where possible, that a wheelchair user should transfer to an approved vehicle seat or size appropriate paediatric car seat and be secured using the vehicle occupant restraints. Transport safety research has shown that this is the safest place for a vehicle passenger to sit, due to the strict safety and crash testing regulations with which vehicle occupant restraints and vehicle and car seats must comply. (1-Standards Australia, 2009)

The wheelchair should also be secured in a forward facing position using approved tie-down points and any detachable objects such as trays, mounting and communication devices or medical equipment must be secured in the vehicle.

The choice between travelling in a vehicle seat or size appropriate paediatric car seat versus a wheelchair may be dictated by the following:
- The user’s requirement for extra postural support that a vehicle seat or car seat cannot provide;
- The safety of carers and/or the wheelchair user when transferring to or from the vehicle seat or car seat;
- The safety considerations and ability of the vehicle to be used to transport a person seated in a wheelchair;
- The wheelchair user’s requirement for independent mobility when travelling in other forms of transport such as taxis.

If it is not possible for a person to transfer to an appropriate vehicle seat or car seat and they need to be transported in their wheelchair, it is recommended that they travel in a wheelchair that meets Australian Standards. (1-Standards Australia, 2009, p.46)

The Australian Standards contain documents relating to transporting wheelchairs and wheelchair users that have been produced by Standards Australia. This is a national non-government body that is funded to establish guidelines through consultation and provide advice about best practice for the benefit of Australians. The guidelines are based on international and national research and standards. Australian Standards are not legal documents, however many are put into legislation by the government or may be referred to within the legal system as “Best Practice” guidelines.

Please see www.standards.org.au for further information.

Current Standards relating to Transporting a wheelchair user

Standards are continuously being updated to keep in line with current national and international research. The Standards are separated into categories that cross-reference to other relevant Standards, as required. The most relevant Standards for transporting a wheelchair user include:
<table>
<thead>
<tr>
<th>Standard</th>
<th>Application</th>
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<tr>
<td>AS/NZS 3696.19:2009 – Wheelchairs – wheeled mobility devices for use as seats in motor vehicles.</td>
<td>This Standard is relevant for people who cannot transfer into a standard vehicle seat and need to travel in a wheelchair. It gives recommendations around using a wheelchair as a seating system for transport and how to best secure a wheelchair and related items for transport.</td>
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<tr>
<td>AS/NZS 10542.1:2009 - Technical systems and aids for disabled or handicapped persons – Wheelchair tie-down and occupant-restraint systems – Requirements and test methods for all systems.</td>
<td>This Standard provides information on requirements, positioning and testing methods for all wheelchair tie-down systems and occupant restraint systems.</td>
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<tr>
<td>AS/NZS 10542.2:2009 - Technical systems and aids for disabled or handicapped persons – Wheelchair tie-down and occupant-restraint systems – Four point, strap tie-down systems.</td>
<td>This standard relates specifically to the requirements, positioning and crash-testing methods for all four-point strap-type tie-down systems.</td>
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**Key Points**

**Backrest**

The backrest should reach the height of the shoulder to reduce the risk of spinal injury during an accident or near miss. A low back rest does not provide the necessary support to reduce the rearward movement of the trunk during an emergency stop or accident. (1- Standards Australia, 2009, p.46)

**Headrest**

A headrest that is positioned correctly can assist in protecting the wheelchair user’s head and neck by limiting the rearward movement that occurs in an accident or near miss. To be effective it must be: (1- Standards Australia, 2009, p.10 & p.46)

- padded;
- positioned within 50mm of the back of the head;
- the centre of the headrest must be at least as high as the rear-most point of the occupant’s head during transport (generally the occiput).
Anterior head and neck supports

Anterior head supports (such as forehead straps and pads) attached to wheelchairs and headrests are not considered safe during transport. If their postural benefits outweigh the risks of injury in an accident or near miss it is recommended that a thorough risk assessment is carried out. All alternative options should be considered prior to their use in transport. Please refer to the Yellow Book or TranSPOT for further information and alternative options. (TranSPOT, 2010)

Stealth i2i

The Stealth i2i is a style of headrest that is used for active head positioning. It uses the combination of a sub-occipital support and anterior stabiliser arms (contacting shoulders and upper chest) to assist with head positioning within a seating system.

While this postural support may be necessary for the client’s wellbeing during transport, it needs to be assessed as to whether it provides support at the height of the most posterior part of the head. (1-Standards Australia, 2009, p.10 & p.46) If it does not, then it is recommended that an additional occipital component should be prescribed to meet the current standards. This must be positioned within 50mm (1-Standards Australia, 2009, p.10 & p.46) of the back of the wheelchair user’s head to provide protection for the head and neck in a vehicle accident or near miss.

Another option may be to use an alternative headrest with or without an anterior trunk support for transport, if this is more suitable for the client.

It is not recommended to use the i2i removable chin prompt or anterior head supports during transport.

Pelvic Belts and Harness/Shoulder Straps

Pelvic belts, harnesses and shoulder straps are postural positioning devices. They are NOT crash tested and are NOT a replacement for a vehicle occupant restraint.

When prescribing a pelvic belt as a positioning device, a four-point pelvic belt may be advantageous as the four points of attachment may reduce the possibility of the pelvic belt moving upwards over the soft tissue over the abdomen in the event of an accident or near miss.

The Spastic Centre currently has a position statement and mandatory guidelines on safe harness prescription and fitting. They are considered best practice and must be adhered to by Spastic Centre staff. These documents may be accessed on request.

Belt Cutter

It is recommended by TranSPOT that a belt cutter is carried in a vehicle transporting a person in a wheelchair to cut postural restraints or wheelchair tie-down straps in an emergency. (TranSPOT, 2010)
Shoulder keepers and pelvic keepers (sub ASIS bars)

Shoulder keepers and pelvic keepers are rigid components that are used to secure the trunk and pelvis (respectively) in an optimal position within the seating system. When prescribing either as a postural support, transport implications need to be considered. These include:

- the ability to position the vehicle occupant restraints to maintain full contact with the body around the rigid components;
- pelvic keepers that are poorly positioned can increase the risk of abdominal injury in a vehicle accident or near miss;
- the ease of evacuating the wheelchair user in case of a vehicle emergency.

In some cases it may be advisable to use a pelvic belt and/or harness/shoulder straps to aid with pelvic and/or trunk positioning during transport instead of pelvic keepers and/or shoulder keepers.

Trays

A hard tray is not recommended during travel, as it may cause abdominal or facial injury to the user or become a projectile if not secured properly in the event of an accident or near miss. If anterior trunk support is necessary, consider alternative options, such as:

- supportive arm rests
- secured soft tray - made of fire retardant foam and <2kg in weight – as recommended by TranSPOT. (TranSPOT, 2010)
- a harness to assist maintaining optimal trunk postural position during travel (NOT to be considered a vehicle occupant restraint).

Powered mobility controls

- A head array can be considered as a headrest for travel, if it meets the requirements listed for headrests. However, the electronics may be at risk of damage in the case of an accident, if excess pressure is applied through the head array. It is advisable to remove head arrays for travel and store securely in the vehicle and use an alternate headrest where possible.
- Chin controls could cause an obstruction in the case of an accident if left in front of the user. It is recommended they be swung aside or removed for travel and stored securely in the vehicle where possible.
- It is recognised that removing powered mobility controls may not be feasible for users who require independent mobility when travelling in a vehicle. Care should also be taken when unplugging and re-plugging electronics to prevent damage.
- Powered wheelchair controls should be switched off during travel.

Communication devices and mounting systems

Communication devices and mounting systems must not be left in front of a wheelchair user for travel, as they could cause abdominal injury or become a projectile, if not secured properly. The device is also at risk of damage. It is recommended to remove devices and place in a padded bag and store securely in the vehicle. Mounts should be removed and also stored securely in the vehicle.
There are some mounting systems that are suitable to remain on the wheelchair for travel, when positioned at the rear of the wheelchair. It is still recommended to remove the device and store securely. Contact TASC or Technability for more information on mounting systems.

If access to communication is required during transport, it is recommended making a low tech system (such as a communication book) available to the wheelchair user.

**Tilt-in-Space/Recline:**

It is recommended that the backrest should be no more than 30 degrees from the vertical position. (1-Standards Australia, 2009, p.46) This can be a combination of seat-to-back angle, recline and/or tilt. If the backrest is reclined further than this it may reduce the effectiveness of the vehicle occupant restraint positioning devices. (1-Standards Australia, 2009, p.46) This will put the wheelchair user at increased risk in case of an accident or near miss. However, it is recognised at times that this may not be practical. If a wheelchair user has to be transported with a wheelchair backrest angle greater than 30 degrees to the vertical a thorough risk assessment is recommended and all risks and benefits must be considered. In a vehicle transporting multiple occupants, it is recommended that a wheelchair user who is transported with a backrest angle greater than 30 degrees is transported at the rear of the vehicle and the upper shoulder belt anchor point should be moved rearward in the vehicle to help maintain contact of the shoulder belt with the torso and shoulder. (1-Standards Australia, 2009, p.46)

**Positioning the vehicle occupant restraints**

There is a clear difference between a postural restraint and vehicle occupant restraint. Postural restraints are designed to assist in optimal positioning of a person in their wheelchair seating on a day-to-day basis and have not been crash tested or designed to be used as a vehicle occupant restraint. A vehicle occupant restraint is intended to prevent ejection from the seating and provide protection against the vehicle interior and other occupants in the event of an accident or near miss. (2-Standards Australia, 2009, p.3)

It is crucial that a vehicle lap belt is positioned correctly during transport to ensure its effectiveness and occupant safety. Australian Standards recommend that:

- the lap belt is positioned low down near the thigh-abdominal junction so that majority of the force will be transmitted over the bony structure of the pelvis and hips; (2-Standards Australia, 2009, p.10)
• the lap belt should pass from the upper thighs at approximately 45 degrees; (1-Standards Australia, 2009, p.47)
• the shoulder belt is positioned to pass over the middle of one shoulder diagonally crossing the chest; (1-Standards Australia, 2009, p.10, p.46)
• the lap belt and shoulder belt junction should occur near the hip joint on the opposite side to where the shoulder-strap crossed the shoulder;
• all restraints should be in good contact with the occupant’s body; (1-Standards Australia, 2009, p.10)
• restraints must be inspected on a regular basis and must be replaced when slippage occurs or when they appear frayed; (1-Standards Australia, 2009)
• wheelchair tie-downs and occupant restraint straps should not be routed around footrest assemblies, armrest assemblies or wheelchair wheels. (2-Standards Australia, 2009, p.6)

Public transport, such as buses and ferries, may have alternative wheelchair transport arrangements compared to private passenger vehicles, as they are regulated by a separate standard. This is due to the variety of sizes and types of wheelchairs that they transport. Generally, they require the wheelchair user to travel facing rearward in the vehicle without the use of tie-downs. For further information it is recommended that you contact your local transport authority.

Clearance around wheelchairs

Any rigid vehicle component that falls within the wheelchair clear zone must be well padded. These dimensions are:

<table>
<thead>
<tr>
<th>Rear Clear Zone</th>
<th>Measured from the rear-most point of the occupant’s head:</th>
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<tr>
<td></td>
<td>• 400mm (2-Standards Australia, 2009, p.11)</td>
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<tr>
<th>Frontal Clear Zone</th>
<th>Measured from the most forward point of the occupant’s head (the measurement is dependant on the style of vehicle being used):</th>
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<td></td>
<td>• 650mm when using an upper torso vehicle restraint (2-Standards Australia, 2009, p.11)</td>
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<tr>
<td></td>
<td>• 950mm when using only a pelvic vehicle restraint (2-Standards Australia, 2009, p.11)</td>
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In case of an accident or near miss

The wheelchair and tie-down restraint systems should be inspected by the manufacturer’s representative before reuse. (1-Standards Australia, 2009, p.16)
**Summary**

This article is a guide for safely transporting a wheelchair user in their wheelchair in a vehicle. As the Standards are constantly being updated as new information becomes available, this article should *never* be used without consulting the current Australian Standards. Whilst the information in this article is recommended as best practice for transport, it should never be used in a way that compromises the wheelchair occupant or other vehicle users’ health and safety. For each individual wheelchair user the benefits and risks of being transported in a wheelchair (including additional components) need to be considered. A risk assessment and/or consultation with other professionals (e.g. medical physician, occupational therapist, R.T.A or TranSPOT) may be required.

**References**


**Bibliography and Recommended Reading**


The Yellow Book

The Yellow Book is a guide to implementing the Australian Standards relevant to transporting people who have a disability. It includes checklists and documentation guidelines that should be used in conjunction with the Australian Standards to assist in forming recommendations around transport safety issues. It is only a guide and should never be used without consulting the relevant standards.

It has been developed by the TranSPOT Committee and the updated version is due out in 2010.

Contact TranSPOT for details.