

WHEELCHAIR ADJUSTMENT

All clients are unique in their body size and shape, functional abilities, recreation and work needs. Their wheelchair should be able to be adjusted to accommodate these factors. This will facilitate optimal wheelchair performance for that particular individual. Clients should be educated about the adjustment features of their wheelchairs and be encouraged to adjust them as their needs or abilities change but also be educated in any safety concerns eg wheelchair stability.

Types and methods of adjustment will vary from one model to another, but the basic principles are the same. Many models of wheelchairs will include a user manual on supply to assist with wheelchair adjustments for that particular model.

Below are some of the most common adjustments.

BACKREST HEIGHT

The appropriate backrest height is largely a trade-off between posture, comfort and freedom of movement. Some factors that may influence the decision are:

- ◆ Type and degree of disability (muscle power and sensation)
- ◆ Balance
- ◆ Posture
- ◆ Current level of skill
- ◆ Pain

Generally, a high backrest will be more comfortable and offer more postural support and a lower backrest will allow more movement of trunk if desired. It is rare that the back will need to be higher than the scapula in someone who self propels – this will make it more difficult to propel the wheelchair.



Many models of wheelchairs offer adjustability in backrest height. Therefore backrest height can be adjusted as a clients balance and level of skill improves. Providing adequate postural support needs to be considered in this process. Inadequate backrest height can lead to long term postural and skin related problems and pain.

If a rigid back support is being considered it is important to ensure that the back rest height will allow this to be fitted.

BACKREST ANGLE

The backrest angle is adjustable on most rigid frame wheelchairs, and may need to be adjusted to achieve good postural alignment and comfort. This option is usually **NOT** available on most folding frame wheelchairs.

Adjustment of this feature is also particularly important if the angle of the seat is altered.



FOOTPLATE HEIGHT ADJUSTMENT

Adjustment of footplate height can affect seating in two main areas:

- ◆ Posture – if footplates are too low then the pelvis may slide forward encouraging a posterior pelvic tilt. If they are too high this causes inadequate thigh support and the legs and pelvis may rotate to one side.
- ◆ Seating pressure distribution - good pressure relief relies on distribution of pressure over the largest possible surface area. If the footplates are too high, pressure may be concentrated over the ischial tuberosities, potentially leading to pressure problems. If the footplates are too low, excessive pressure may be exerted on both the coccyx and the back of the thigh.



As a general rule, to achieve correct footplate height, lower the footplates until the heels just touch the footplate, then raise footplates approximately 2.5cm.

THE CASTERS

To achieve optimal wheelchair performance, the caster pintle angle must always lie at right angles to the floor to ensure the casters track correctly.

If casters are incorrectly adjusted, they may:

- ◆ ‘flutter’ when the wheelchair is pushed, especially at higher speeds
- ◆ cause the front of the wheelchair to rise and fall during turning
- ◆ ‘float’ above the floor at times



Caster angle is usually adjusted through a series of offset bolts, although this may vary according to the model. A carpenter's square is useful in attaining correct alignment. **Ensure this adjustment is performed on flat ground.**

If flutter persists, the nut at the top of the caster stem may need to be tightened. Be careful not to over tighten it, as this may restrict movement of the caster. There may also be horizontal play between the caster fork and wheel. Again, the nut should be tight but not restrict movement.

Always check caster alignment when any adjustments are made to the angle of the seat. If the caster angle is not adjustable, adjustment of the seat angle will cause the wheelchair to perform less efficiently.

REAR AXLE ADJUSTMENT

With adjustments to the rear axle of a wheelchair, it is important to consider how the centre of gravity will be affected. Adjustments to the centre of gravity will impact on the wheelchair's stability and performance. A client's safety and stability in the wheelchair is paramount, so careful consideration should be given to these adjustments before they are made. It is possible to alter the centre of gravity in two ways:

- ◆ Up or down in relation to the ground
- ◆ Forward or backward

UP OR DOWN

This is usually achieved by moving an axle block up or down the frame in a series of pre-drilled holes or by clamps on the down tubes. Some models do not have this adjustment option.

Adjustments up or down will affect the rear seat-to-floor height, causing the seat to be more raked. Usually, lowering the rear seat height will make the wheelchair more stable. However, it may also change the wheelchair propulsion biomechanics eg elbows may be more bent when pushing the wheelchair. With an increased slope in the seat, it may be more difficult to transfer.

With this adjustment, the caster and backrest angles will also need to be adjusted and efficiency of brakes checked.



FORWARD OR BACKWARD

Moving the axle towards the front of the wheelchair will make the wheelchair significantly easier to push and turn, as it reduces the weight through the front casters. However, this will also make the wheelchair much easier to tip backwards. There is also less space available at the front frame of the chair which may impact on transfers. It is important to find the right balance, and this may take some time and patience. It may be safer to use anti-tip devices initially if unsure.



Moving the axle backwards will result in the wheelchair being harder to push and turn, but less likely to tip backwards. It is also important to note that moving the wheel forward or backwards will also change the amount of push-rim available to push on. This may in turn change the propulsion biomechanics, making it more or less efficient.

This adjustment is usually made by sliding the axle forward in a slot, moving the axle to another hole, or sliding a clamp along the wheelchair tubing. Occasionally, this adjustment will be achieved by changing the seat position with respect to the axle. Again this varies according to the model.

Brakes will need to be adjusted.

REMEMBER: Exercise caution when adjusting the centre of gravity. It is best to do it a little at a time.

WHEEL CAMBER

Camber refers to the slant of the wheels, usually towards the frame at the top. In wheelchairs with an axle block, camber is achieved by placing washers between the axle block and frame at the bottom of the axle block. In wheelchairs without an axle block, it may be necessary to replace an entire axle to adjust the camber of the wheels. Some more recent models offer an adjustable camber through interchangeable camber tubes.



Some of the benefits of camber include:

- ◆ Greater side to side stability due to increased width of the base of the wheelchair
- ◆ Quicker turning
- ◆ A more natural pushing action (it is easier to push down and out)

It is important to note that by adding camber to the wheels, the total width of the wheelchair will be increased. This may affect access through doorways or other narrow spaces. It may also reduce the areas available for the client to sit in, as the top wheel distance will be less.