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SEATING AND POSTURE ISSUES – POSSIBLE SOLUTIONS

This chapter includes additional information for professionals who prescribe wheelchairs, about the needs of users with neuromuscular conditions.

It should be read in conjunction with chapters 6 and 7 which detail the clinical reasoning for the solutions suggested here.

Dealers and representatives of assistive technology companies who provide equipment demonstrations and/or help with provision should be made aware of the clinical issues in the long-term management of neuromuscular conditions. Collaboration between the assistive technology provider and the therapist can produce the best outcome for a user.



PELVIS AND HIPS

POSTURAL ISSUE AETIOLOGY,
EFFECTS AND ASSESSMENT

WHEELCHAIR AND SEATING EQUIPMENT

Anterior pelvic tilt (APT)

Aetiology:

- Tight hip flexors
- Weak muscles
- User finding it a stable position

Effects:

APT causes increase in the lumbar lordosis and reduces the functional reach of a user (more so than a posterior pelvic tilt).



Assessment:

By height discrepancy, with ASISs lower than PSISs

Regularly check the position of the pelvis so any changes can be quickly detected.

Management will depend on whether the APT is fixed or correctable.

The following are possible solutions and either one, or a combination, may help.

Solutions:

1. A good quality, tension adjustable back canvas with many narrow straps which can be adjusted to encourage 'softening' of excessive lordosis. A standard back canvas is inappropriate
2. Create a rearward sloping seat and carefully set up the back angle to reduce the tendency to lumbar lordosis
3. Using an adapted tray to form an anterior support for the trunk is often very effective and functional for the user
4. Padded pelvic positioning accessories (i.e. belts, straps and harnesses) can be used but need to be tight to be effective and are, therefore, not always well tolerated
5. Open the hip angle by altering the seat angle or using the recline function. Be careful not to cause the pelvis to slide forwards
6. Tilt-in-space is very beneficial

Modifications to posture and position are best done in small incremental changes as these allow the user to physiologically adapt to them

PELVIS AND HIPS

POSTURAL ISSUE AETIOLOGY,
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WHEELCHAIR AND SEATING EQUIPMENT

Pelvic obliquity

Aetiology:

- Muscle weakness (including head and neck)
- Effects of gravity
- Asymmetric postures
- Poor seating



Effects:

- Asymmetrical posture and detrimental effect on sitting balance
- Asymmetrical weight bearing, increasing risk of tissue breakdown
- Physiological implications include restricted respiration, digestion

Assessment:

Palpate the ASISs and check for a height discrepancy between them. Record any obliquity and associated spinal scoliosis so it can be monitored. With any obliquity there is nearly always a compensatory scoliosis. To assess a scoliosis, palpate the spinus processes along the length of the spine. If taking photographs, it may help to stick coloured paper dots over the processes.

It is also worth checking for rotation which will display as one ASIS being posterior/anterior to the other.

Regularly check the position of the pelvis so any changes can be quickly detected.

Management will depend on whether the pelvic obliquity is fixed or correctable.

Contributing factors may be:

- seat is too wide
- arm supports are set too far apart or too low
- worn, sagging seat upholstery and/or unsuitable foam cushion
- incorrect orientation/use of a specialist cushion (unstable laterally)
- insufficient trunk support, causing user to lean more to one armrest for additional support
- unilateral joystick

Solutions:

1. Ensure correct seat dimensions, arm support positioning etc
2. Ensure a level base of support for the cushion
3. Provide appropriate cushion and ensure correct usage
4. If obliquity is flexible, use a specialist cushion to correct
5. If the obliquity is fixed, compensate by building up the high side and/or lowering the low side to even out contact area throughout the cushion
6. Ensure sufficient trunk support for level of disability and prescribe proactively
7. Consider alternative position for joystick/specialist control

PELVIS AND HIPS

POSTURAL ISSUE AETIOLOGY,
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Pelvic rotation

Aetiology:



The rotational deformity of the pelvis originates from the spine. When attempting to correct at the pelvis ensure you are not shifting the problem up to, for example, the shoulder girdle

Effect:

Apparent discrepancy between leg lengths due to pelvic rotation.

Assessment:

Rotation can be assessed by palpating the ASISs. Rotation is indicated when one ASIS is posterior/anterior to the other.

A different degree of rotation may be seen at the shoulder girdle and should also be assessed.

Regularly check for any spinal/pelvic rotation and deal with it quickly before it becomes fixed.

Management will depend on whether the pelvic rotation is fixed or flexible.

Using contoured cushions and back supports at an early stage reminds the user to stay in a neutral/symmetrical sitting position.

Wind-sweeping of femurs may also occur.

Monitor and provide the necessary support to prevent abnormal compensatory postures being adopted by the user to gain the desired trunk stability.

Solutions:

1. Check dimensions of chair and components. A chair that is too wide, for example, can facilitate pelvic rotation
2. Contoured cushions with good leg troughs
3. Appropriate lower back support is preferable to a canvas back which may mould to the rotated pelvis
4. Padded belts
5. Sub-ASIS bars
6. Other hip stabilising devices
7. Appropriate trunk support (*see aetiology*)

HIPS, KNEES AND FEET

POSTURAL ISSUE AETIOLOGY,
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Misalignment of femurs

Aetiology:

Wind-sweeping of thighs often associated with pelvic/spinal rotation obliquity or hips abducted and externally rotated

Assessment:

In a supine position. Taking photographs is recommended as measurements can be complex for this posture

Solutions:

1. Hip and thigh guides are helpful
2. Adductor/abductor wedges on a cushion/system
3. Contoured cushion that provides leg troughs
4. Padded leg straps

Flexion contractures at hips occur at an early stage, even in users who are ambulant

Aetiology:

- Muscle weakness
- Loss of elastin in muscle fibre
- Shortened hamstrings
- Weak proximal muscles

Assessment:

With goniometer



Prevention of hip contractures are not the principal concern for users – often with an anterior tilted pelvis – who are more stable sitting with a closed hip angle (i.e. less than 90 degrees between back and seat).

Therapeutic standing and use of the recline function on a wheelchair can help maintain a range of movement in the hip. Physiotherapy is also vital.

Consider bone density when prescribing a wheelchair with a standing function. Tests may be needed before using such a wheelchair, particularly if the user has not been weight-bearing for some time or has used/is currently using steroids.

Flexion contractures at the knees usually occur once an individual becomes a wheelchair user

Aetiology:

- Muscle weakness
- Loss of elastin in muscle fibre
- Shortened hamstrings
- Weak proximal muscles

Assessment:

With goniometer



Regular monitoring of a user's range of movement can help to identify flexion contractures at an early stage.

Any management programme should include physiotherapy. Surgery may be required in some cases.

Solutions/management

1. Determine whether stretching is appropriate with articulating leg supports (with leg length compensation)
2. If stretching is not appropriate, select appropriate hanger angle for the range of movement e.g. 70, 85 or 90 degrees. This might necessitate a change of wheelchair
3. Some footplates can be adjusted forwards and aft (anterior/posterior)
4. Examine the effect of heel and calf straps. Note the pressure exerted by the straps on soft tissues and check for sores/ulcers
5. To avoid compromising posture, consider cushions with calf recesses or customising a cushion. Otherwise, seat depth will need to be shortened which will reduce the surface area of the cushion/seat in contact with the calves and increase the risk of skin breakdown. Pressure needs should be re-evaluated

HIPS, KNEES AND FEET

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Plantar flexion with or without inversion of feet and ankles



Solutions/management:

1. Angle-adjustable footplates (anterior/posterior and medial/lateral)
2. Correct size/shape footplates
3. Padded foot box may be needed to protect feet
4. Ankle huggers
5. Check user does not place heel on top of heel strap so positioning the ankle in plantar flexion

Consider the impact of the above on transfers and independence

Discomfort and pressure issues

Most users spend many hours in their wheelchairs. They have full sensation but are often unable to change position independently or effectively. A suitable high-pressure redistribution cushion used with the tilt-in-space function can promote skin integrity and help users independently maintain comfort

SPINE

POSTURAL ISSUE AETIOLOGY,
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WHEELCHAIR AND SEATING EQUIPMENT

Scoliosis with/without rotation

Aetiology:

- Muscle weakness
- Seeking external sources of support
- Activity based

Assessment:

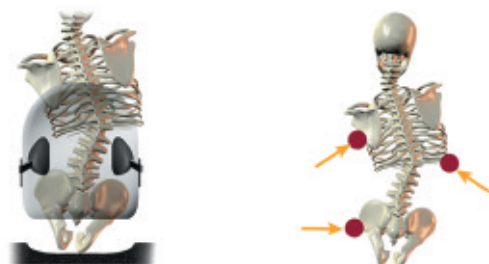
Photography



It is impossible to prevent scoliosis through wheelchair seating alone. Lateral support via thoracics/thoracic pads/laterals will assist, but the condition should be managed by a multidisciplinary team. Stay in regular contact with this team to ascertain what management strategy they propose (e.g. spinal jackets, surgery), as this will significantly influence the wheelchair and seating prescription.

Some users find harnesses give them more confidence and trunk stability when they are out and about, particularly in vehicles or when negotiating uneven ground, slopes and ramps.

Scoliosis can be managed in the early stages with 2-point, usually symmetrical, contact. If the condition is more advanced it may be necessary to use 3-point contact (*see chapter 6*). Check for pressure areas and add extra padding/gel or increase the surface area if necessary.



Swing-away laterals significantly help with transfers and some activities of daily living.

The 3D profile of the back is also important and should encourage the maintenance of the natural curves of the spine.

Respiration can also be affected by scoliosis.

SPINE

Excessive lumbar lordosis associated with anterior tilted pelvis.

Aetiology:

- Muscle weakness
- Seeking external sources of support
- Activity based

Assessment:

Photography



The following are possible solutions and either one, or a combination, may help:

1. A good quality, tension adjustable back sling with many narrow straps which can be adjusted to encourage 'softening' of excessive lordosis. A standard back sling is inappropriate
2. Create a rearward sloping seat and carefully set up the back angle to reduce the tendency to lumbar lordosis
3. Using an adapted tray to form an anterior support for the trunk is often very effective and functional for the user
4. Padded pelvic positioning accessories (i.e. belts, straps and harnesses) can be used but need to be tight to be effective and are, therefore, not always well tolerated
5. Open the hip angle by altering the seat angle or using the recline function. Be careful not to cause the pelvis to slide forwards
6. Tilt-in-space is very beneficial

Small incremental changes to posture and position are best as these allow the user to physiologically adapt to them.

The most effective solution is to encourage some posterior pelvic tilt using the tilt-in-space function with, or without, recline. The degree of tilt is crucial. This can be assessed by manually tilting the user in his or her wheelchair to see at what angle the tilt becomes effective. At least two members of staff are required for this. The head and arms should be supported to stop the arms falling off the armrests while tilting, preventing the user from accessing the controls.

'Filling in' the lumbar gap is rarely effective and can push the lordotic spine into further hyperextension

NECK

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Weak head and neck control

Aetiology:

- Muscle weakness
- Exacerbated by poor trunk posture
- Poor head control with tilt-in-space and no head support



Assessment:

- Physical assessment
- Simulation of different trunk angles to balance head better

A finely adjusted degree of recline and/or tilt-in-space with head support can help if the user's head is falling forwards or to rest weak neck muscles during the day. Some users, however, may need to be fully supported at all times. While profiled head supports that give good contact and support are generally well tolerated, some do make the user feel too enclosed or restrict hearing. More minimal head supports are available.



This image is the property
of Otto Bock Healthcare Plc

Very rarely and as a last resort, headbands are used to support the head anteriorly. These must be used exceedingly carefully for safety reasons. It is essential that these are secured to prevent the band falling down over the face and/or neck. There is also concern about subluxation of the cervical spine.

Where users have this level of disability, specialist controls are often required. Ensure that the head support is compatible with the controls to be used now and in the future.

A simple head support is enough if the user only requires support when being transported.

A spine which has been fused surgically is usually fixed from cervical to lumbar spine and may not include the pelvis. The fusion may include the pelvis.

Aetiology:

- Fused spine and possibly with pelvic inclusion

Effects:

- Forward flexion only possible from the hips
- New fixed spinal posture
- Activities of daily living tasks must be reassessed

Assessment:

- Range of Movement (ROM)
- Functional abilities
- Degree of support required

Ascertain level of spinal fusion and whether the pelvis is included.

Solutions/management:

Solutions and management will depend on the seating and wheelchair prescription made before the operation (pre-op). It is advisable that seating requirements should always be discussed prior to spinal fusion surgery, especially in regions where Wheelchair Services are busy and need to plan ahead. Some centres can offer temporary seating until Wheelchair Services can re-evaluate the user's needs post-op

1. A mould, or similar, which was used before the operation cannot be used post-op. Alternative interim seating should be arranged as a temporary measure. The seating assessment may need to be undertaken at the user's home as he or she may not be well enough to undergo a seating assessment, or fit enough to travel. Post-op procedures vary from region to region and this should be investigated in advance. Appropriate seating is essential to aid recovery
2. After spinal surgery, the user often appears taller as the trunk is more extended. If using laterals etc pre-op, these will need repositioning in the existing wheelchair four or five days after the operation
3. If the user no longer needs a spinal jacket, the seating will need to be narrowed to provide appropriate support. Existing equipment can be adjusted or new equipment may be required

A full seating assessment for long-term needs is usually required three to four weeks post-op. This assessment should take into account any changes that may have occurred in functional ability (such as feeding, moving and handling etc).

NECK

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Use of orthoses

1. Spinal jackets
2. AFOs

Many users will at times wear orthoses. A spinal jacket is often worn by users with a scoliosis either instead of, or prior to, surgery.

Spinal jackets – issues to consider:

1. Width issues especially when the jacket is put on/taken off as that can compromise position of lateral supports and armrests (due to spinal collapse)
2. Heat and air circulation
3. Breast development in girls
4. Range of materials used

AFO – issues to consider:

1. Foot support height
2. Foot support angle

The height and angle of the footplate may need adjusting for different footwear. Carers and parents need to be aware of these issues at time of supply.