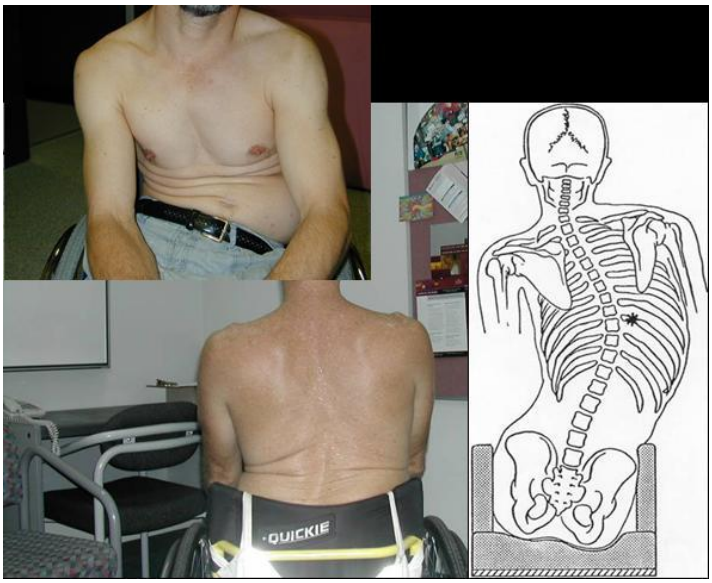
POSTURAL ASSESSMENT
AND
SEATING SYSTEMS

FOR PEOPLE WITH SPINAL CORD INJURY

INFORMATION RESOURCE FOR SERVICE PROVIDERS



SPINAL OUTREACH TEAM

The Queensland Spinal Cord Injuries Service

SPOT Spinal Outreach Team

Queensland Government

CONTENTS

SPINAL OUTREACH TEAM
3rd floor Buranda Village
Cnr Ipswich Rd and Cornwall St
Buranda Q 4102

PO Box 6053
Buranda Q 4102

Ph: 07 3406 2300
1800 624 832
Fax: 07 3406 2399

Email: spot@health.qld.gov.au

Website: www.health.qld.gov.au/qscis/spot.asp

SPINAL CORD INJURY – AN INTRODUCTION

Seating system selection for people with spinal cord injury (SCI) can often seem like a complex process and you may not know where to start. This document will assist you to work through the assessment, trial and prescription process to achieve the best outcome for the client.

To begin it is useful to consider the relevant factors relating to people with SCI that you need to consider throughout the process. These are divided into intrinsic and extrinsic factors.

INTRINSIC FACTORS

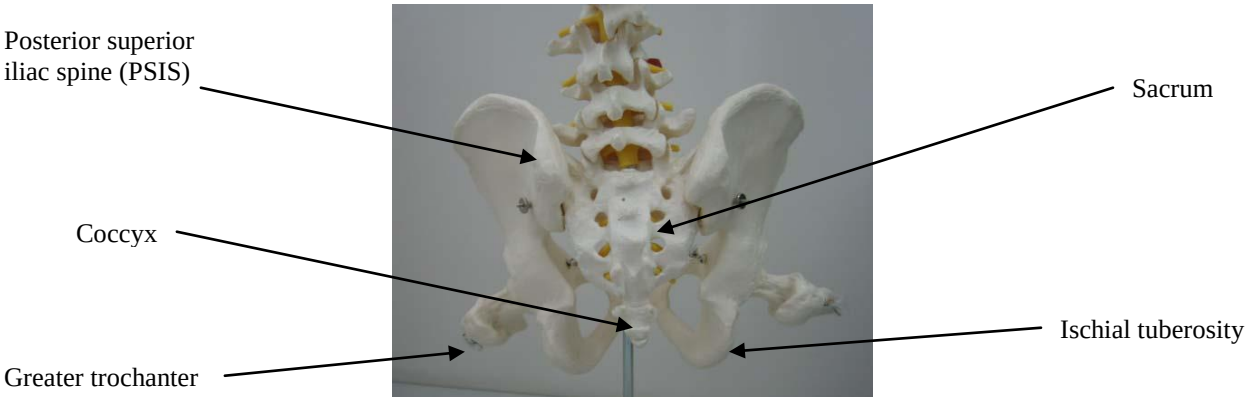
- Clients neurological level of injury ie level of motor power and sensation
- Age and general health – any relevant ageing issues
- Body weight
- Sitting balance
- Level of physical function and independence – transfers, propulsion technique, ability to pressure relieve, driving ability
- Pain and its impact in sitting
- Musculo-skeletal issues – postural deformities (fixed or flexible), contractures, range of movement
- Abnormal tone and spasticity
- Muscle wasting (atrophy)
- Skin integrity issues – circulation status, history of skin breakdown, scarring
- Continence – bowel and bladder management as moisture etc will impact on skin integrity
- Other psycho-social issues

EXTRINSIC FACTORS

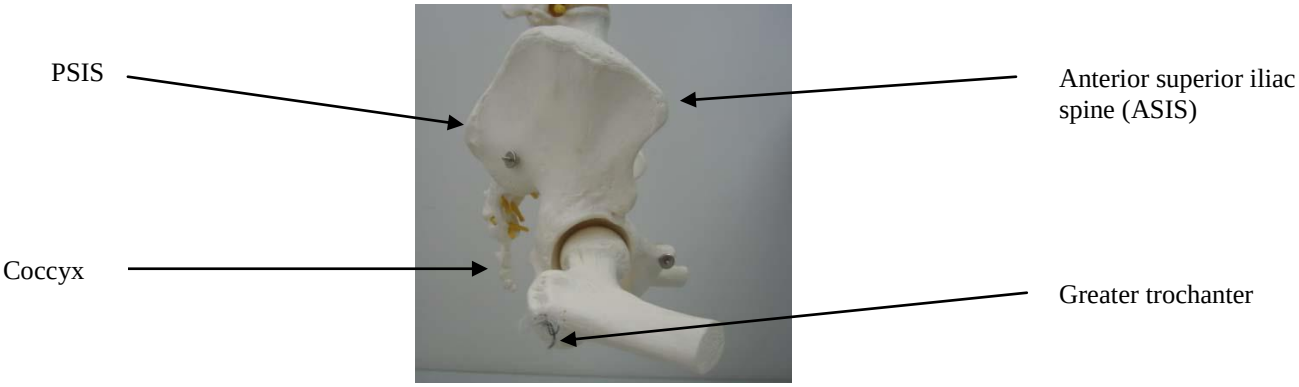
- Pressure – vertical forces due to gravity exerted when sitting especially acting through bony prominences
- Shear forces – horizontal forces acting between a body and its supporting surface. If significant, layers of skin and underlying tissue move in opposite directions to bony prominences. This causes a stretch on blood vessels and a decrease in blood flow.
- Current equipment eg wheelchair and its setup
- Care situation
- Lifestyle – employment, study, recreation
- Financial issues and funding sources
- Demographics – is client from rural/remote area
- Care and maintenance of equipment – client reliability

DO YOU KNOW THE BONY LANDMARKS?

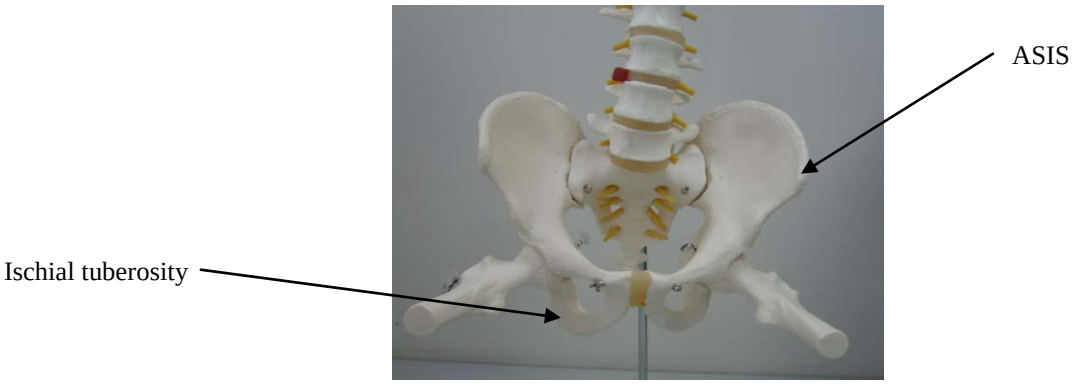
Before you can assess and prescribe seating equipment for clients, you need to be aware of the bony landmarks and how to find them on your client. Below are some photos/diagrams about the location of bony points on the pelvis and spine that are important in seating.



Posterior view



Lateral view

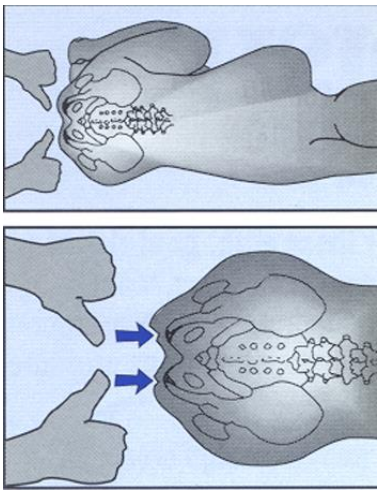


Anterior view

ASIS

PSIS
(dimple)

Locating ischial tuberosities in side lying



GENERAL PRINCIPLES OF SEATING

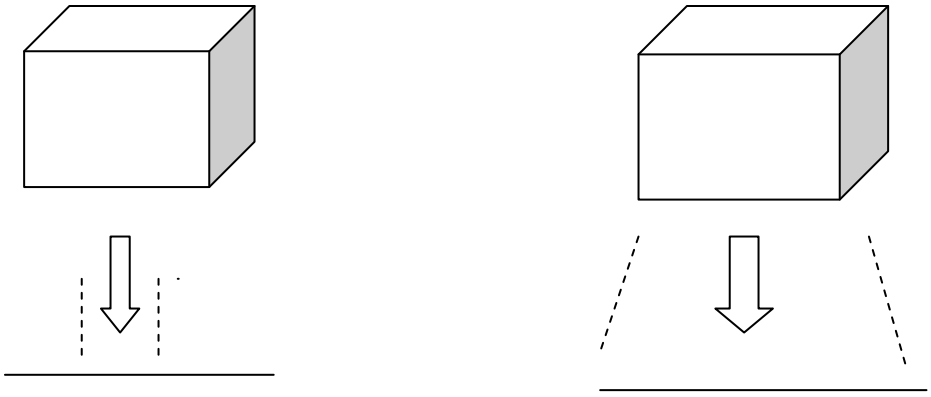
When assessing a client for a new seating system, there are a number of principles to consider. These are detailed below.

1. MAXIMISE SURFACE AREA CONTACT

In sitting, the bony prominences that bear the maximum of body weight are:

- ischial tuberosities – in neutral sitting, these take approximately 80% of the seated body weight
- greater trochanters – posterior aspect, under the hip joints
- sacrum and coccyx – these take weight when in reclined or posteriorly (backward) tilted position of pelvis

The pressure generated at any point on the skin is determined by the mass or force that is applied per unit area. That is Force = mass divided by area.



A certain mass or force applied over a small area will generate a much higher pressure than the same force or pressure generated over a larger area. The diagram above illustrates this.

The main aim of any seating system is to distribute the pressure (or weight) over as wide an area as possible. Therefore having a cushion that is appropriate to the client in size and body dimensions in both width and depth; will allow better pressure redistribution. A cushion that is contoured to the body surface rather than flat will also improve the surface area contact. See more detail in later chapters.

2. MAINTAIN OR IMPROVE POSTURAL ALIGNMENT

When sitting upright, the greatest proportion of body weight is centred over the ischial tuberosities. The ideal posture assumes a neutral tilt of the pelvis and a normal curve in the back known as a lumbar lordosis (see Figure 1). Pressure is distributed equally between both ischial tuberosities. The aim of any seating system is to **correct** body alignment. If this is not possible due to a lack of flexibility, then postural alignment should be **accommodated** as symmetrical as possible within the seating system.

When assessing a client, it is rare that you will find them sitting with the ideal posture. When the posture is not ideal, pressure can be distributed unevenly or in areas not intended to be weight bearing.
In these cases you may find them sitting in a number of other ways:

a. Posterior pelvic tilt with associated kyphosis
b. Anterior pelvic tilt and excessive lordosis
c. Pelvic obliquity and scoliosis

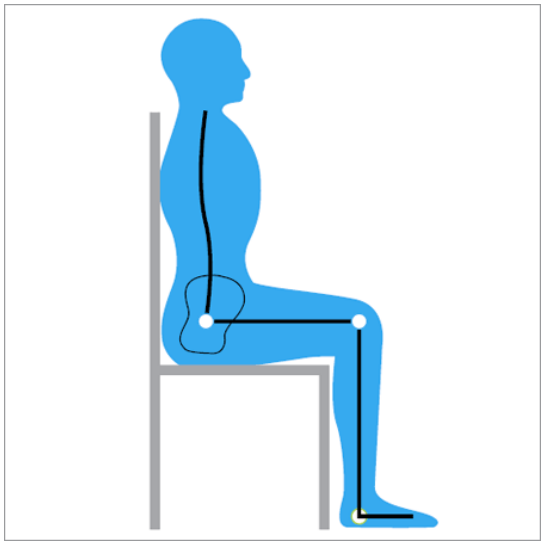


Figure 1

a. Posterior pelvic tilt (sacral sitting) with associated kyphosis (see Figure 2)

- the hips have moved away from the back of the chair and the pelvis is tipped backward
- the PSIS is lower than the ASIS
- the upper back and lumbar spine form one long C curve
- the chin is often poked forward
- body weight is centred behind the ischial tuberosities and over the sacro-coccygeal area.
- Causes may be due to:
    - the client may have adopted this position for stability and function
    - poor sitting balance
    - age related issues
    - decreased range of movement in spine and hips
    - hamstring tightness or spasticity
    - equipment related issues: stretched back upholstery, low back height, seat depth too long

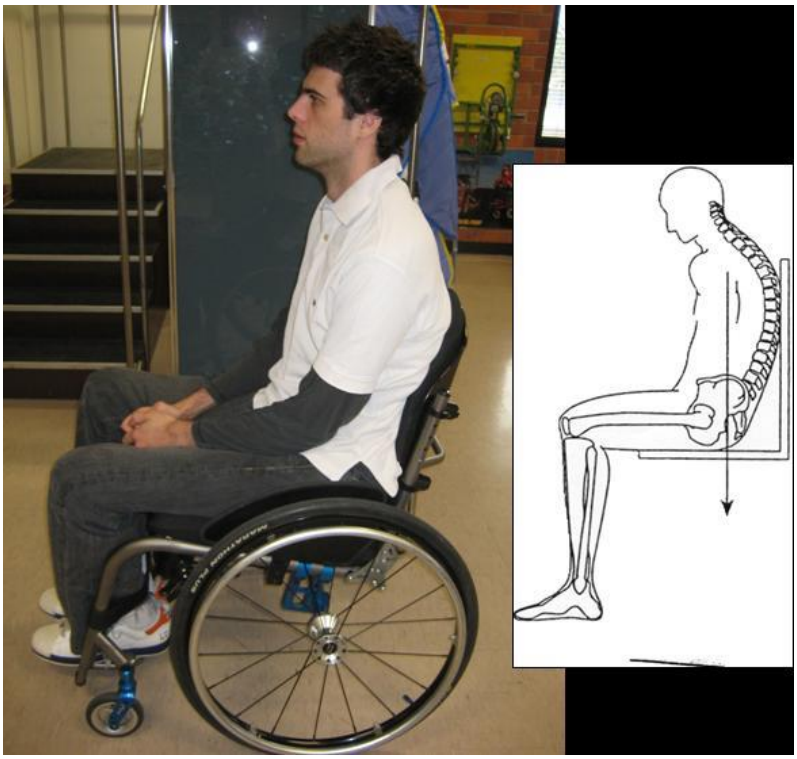


Figure 2: Posterior pelvic tilt and kyphosis

b. Anterior pelvic tilt and excessive lordosis (see Figure 3)

- the pelvis is tipped forward which subsequently results in an abnormally increased lordotic curve
- the PSIS is higher than the ASIS
- weight is taken more anteriorly over the ischial tuberosities and can be directed towards the perineum and pubic bone.
- not as common in people with SCI but it does occur especially in the higher thoracic lesions
- causes may be due to:
    - tightness or spasticity in the hip flexors
    - proximal muscle weakness
    - lack of trunk stability with respect to gravity
    - growth related especially from childhood eg clients with spina bifida

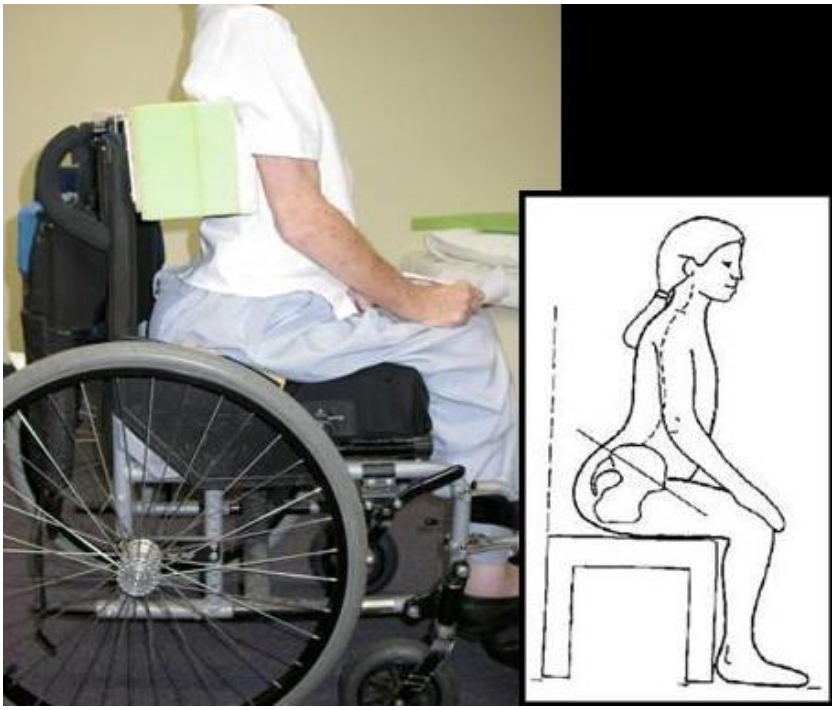
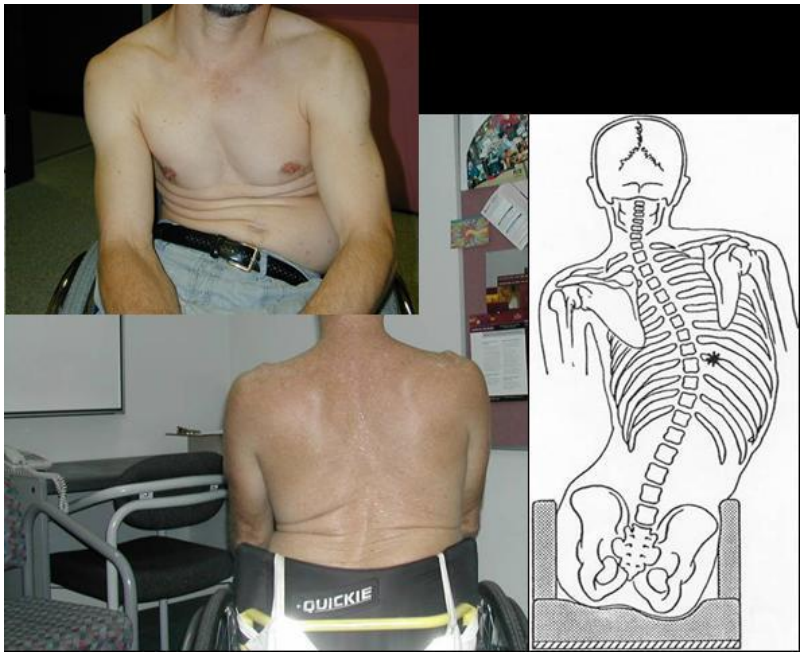


Figure 3: Anterior pelvic tilt and lumbar lordosis

c. Pelvic obliquity and scoliosis (see Figure 4)

- one side of the pelvis is lower than the other side
- one ASIS and PSIS is lower than the other side
- a compensatory lateral spinal curve (scoliosis) can develop above the obliquity which is often referred to as the primary curve. Sometimes to correct position in space and visual field, a secondary curve may develop above the primary curve
- weight is greatly increased through one ischial tuberosity and greater trochanter
- causes may be due to:
    - muscle imbalances
    - spasticity and tonal assymetry around the trunk and pelvis
    - lack of stability in seating
    - repetitive postures and activities eg hooking arm around upright of wheelchair, leaning on desk unilaterally whilst at computer station
    - orthopaedic issues including healing of fracture site of original spinal injury
    - hip subluxation or dislocation
    - unilateral loss of hip flexion range
    - premorbid factors
    - equipment related issues: sagged sling seat of wheelchair, poor supporting cushion, low or non-supportive back height



Primary curve - convex to the right and concave to the left

Secondary curve - convex to the left and concave to the right

Figure 4: pelvic obliquity and scoliosis

3. PROVIDE A STABLE BASE OF SUPPORT

The provision of a stable base of support and trunk stability will maximise function in the person with SCI, and assist in minimising the development of other issues such as poor postural alignment. For example, a person with a SCI may have developed a scoliosis because of a lack of lateral stability and a resultant need to hook one arm continually around the push handle of the chair.

Stability can be addressed by using a very firm base to their wheelchair seat eg firm upholstery, a rigidiser in their cushion or a firm seat base such as wood. Trunk stability can be addressed by back supports either commercial or custom. An increase in stability will generally produce a decrease in energy consumption during daily activities. It is important to the person with SCI that their independence is not compromised by improving stability and this issue needs to be considered and discussed with the client.

4. DECREASE ABNORMAL TONAL INFLUENCES

People with SCI experience varying degrees of tonal abnormalities or spasticity that can impact on movement during attempted tasks. If significant, these issues will need to be considered.

In seating, spasticity may increase for a number of reasons:

- the effort required to compensate for poor trunk stability
- pain from poor positioning in the chair
- a reduction in the length of a particular muscle that then becomes a trigger point if stretched during the seated position
- other systemic reasons such as a bladder infection.

5. PROMOTE INCREASED SITTING TOLERANCE

Comfort is critical in ensuring that the person continues to use the prescribed equipment and is able to sit for the required length of time that meets their ADL, work, study and recreational requirements. Providing appropriate support and trunk stability will reduce the effort involved in maintaining the sitting position and may reduce fatigue. Providing a cushion or seating system that minimises discomfort will enhance sitting tolerance.

6. ENHANCE COSMESIS

A ‘normal’ sitting posture and cosmesis is often very important to a person with SCI and the type of seating equipment will impact on long term compliance. When prescribing cushions also consider the colours, textures, weight and ease of handling as they will also impact on ongoing use of the equipment.

POSTURAL ASSESSMENT AND PRESCRIPTION

POSTURAL ASSESSMENT

When selecting and prescribing a seating system for a client with SCI you are undertaking a problem solving exercise. There is no easy formula that will provide you as the prescriber with the answer. There is an extensive range of products available on the market and no formula to tell you which client should use what product. A thorough assessment and adequate trial period will achieve the best outcome. Ensure that your client and their significant others are an integral part of the assessment and prescription process.

As part of the assessment process you will need to know the individual's situation (refer back to Chapter 1):

- intrinsic factors such as the client's neurological level and function, musculoskeletal status including posture, skin condition and continence needs.
- extrinsic factors such as pressure and shear forces, environment of use, current cushion and wheelchair, and client and significant other comments

A physical evaluation is essential to determine:

- what impact their current equipment is having on posture and function
- whether postural asymmetries are fixed or flexible. This will direct the intervention of correcting or accommodating any issues.
- extent of contractures and other deformities and the impact on seating
- skin condition and presence of scarring on weight bearing areas.

For a thorough evaluation the client needs to be reviewed both **in and out of their wheelchair:**

It is important to work through the assessment in a structured way to determine the major influences on the client's sitting posture. Ask yourself these questions:

- Is a postural deformity you find in sitting still apparent in lying?
- Is it a fixed postural deformity that you will be unable to correct in sitting and will have to accommodate it?
- Is the problem flexible?
- Does the deformity correct in the supine position? If this is the case, then the major influences may be gravity, equipment, habitual postures or lack of hip range of movement.
- Can you then correct the issue by addressing the presenting problems?

It is worthwhile observing the client in their own wheelchair first then following with a supine assessment. Taking note of what was found in supine then assess in an unsupported sitting position for example on the edge of a plinth or firm bed. Remember that sitting on a soft mattress is not ideal. Then lastly review the client back in their own wheelchair to come to the final conclusion and develop a plan of intervention. Following are some factors to consider when in each position.

Refer to Appendix 1 - a guideline to assist you to work through a complete assessment.

1. **Lying supine on a firm surface**
    - Review neurological function including sensation and muscle function, spasticity and muscle wasting
    - Assess skin condition – this can be done in supine with leg flexed or in side lying. Observe any skin problems, scarring and the effect on skin blanching when hips are flexed into a sitting position. Blanching along scar lines when hips are flexed may be a contributing factor in skin breakdown when sitting, as blood supply is diminished
    - Assess pelvic and spinal alignment – observe from above and from the side. Correct any deformity to assess flexibility (See Photos A and B)

Photo A

Photo B

- Assess lower limb range of movement at hip, knee and ankle. Muscle length of hamstrings is assessed through a straight leg raise (See Photo C). Assess calf muscle length. It is also important to review unilateral true hip flexion range as this may impact on symmetry in sitting. This is done by flexing the hip and assessing when the pelvis starts to tilt (see Photo D). There may be an element of heterotropic ossification around the hip joint that is affecting range.

Photo C

Photo D

2. **Sitting unsupported on a firm surface**
    - It is important that the surface is firm otherwise it will impact on the assessment
    - Begin at looking at pelvis then move up the trunk to the head and then distally to legs and feet
    - Consider the clients balance – there may need to be an extra person to assist with safety issues
    - Review posture and pelvic position. Does the client present with the same deformity as in supine? Can it be corrected with hands on facilitation that may simulate equipment that you may consider? See photo E

Photo E

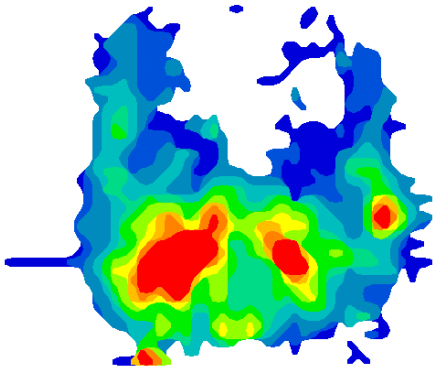
3. **Sitting in the wheelchair with the current system**
    - Observe from the front, side and behind
    - Review clients balance in current system
    - Assess pelvic position then move up the trunk to determine whether fixed or flexible problem – **remember what was found in supine assessment**
    - Effect of current equipment – including wheelchair and back support
    - Look at leg positioning – rotation, abduction
    - Look at effect of dynamic activities on posture eg propulsion
    - Assess whether there are any habitual postures eg arm hooked behind the wheelchair push handles.

INTERFACE PRESSURE MAPPING (IPM)

IPM is becoming more available to prescribers as an adjunct to assessment **but** it is not recommended to be used as the only form of assessment.

There are various devices available on the market. By definition, this produces a display derived from and spatially representing the forces applied to a support surface by the body, as detected by sensors arranged on a Cartesian coordinate array, inserted between the body and support surface.

IPM measures normal forces (mass/force per unit area) at the skin surface. **IPM does not measure shear and doesn't indicate what happens to the tissue below the skin.**



Benefits of IPM:

- Introduces objectivity on
  - how much pressure exists (peak pressures)
  - how well pressure redistribution is being achieved for an individual (contact area and pressure gradient)
- Can confirm clinical intuition
- **Provides feedback and education to clients and care givers about pressure relief and postures**
- Enables an objective comparison of seating options to trial for an individual
- Can identify the impact of equipment adjustments

Limitations of IPM:

- It is an **adjunct** to clinical hands on assessment – it **does not replace it.**
- **Measures pressure only not shear**
- Not absolutely accurate
- Various artefacts need to be considered, eg. creep, mat flexibility, number of sensors
- Does not indicate what happens to internal tissue but only the skin and interface
- Needs experienced person to operate and interpret accurate results
- Technology can fail
- Not predictive of long term outcomes

Parameters of IPM to consider:

- Contact area
- Magnitude of pressure
- Pressure gradient
- Symmetry

TRIAL PROCESS

Once you have completed the assessment and have a good idea of the client's problems / needs, you can then commence the trialling process.

Issues to consider when trialling equipment include:

- Consider client goals versus prescriber goals. These may differ as the client may have comfort and independence as their main priority and yours may be postural control. These need to be discussed with the client and agreed upon.
- Always trial equipment in the current wheelchair of the client. Remember this when measuring as well.
- Commence with a graduated sitting program when trialling cushions to ensure a cushion trial does not result in a skin integrity issue. For example, start trial over a couple of hours then build up sitting time. Stop trial if the cushion is creating problems
- Do not trial cushions if the client has an existing pressure injury. It will be impossible to assess the cushion's suitability. **Wait until skin has healed before trialling**.
- Always trial equipment for **approximately one week** and in all the situations the client normally participates ie home, work, school, recreation.

PRESCRIPTION AND FOLLOW UP

When the trial process is complete and the decision agreed upon between you and the client ensure you have measured the cushion or back support size appropriately before submitting to funding body. (see section on Cushion Measurement). Remember to measure the equipment while the client is sitting in the wheelchair that will be used in the longer term.

Following supply of equipment it is essential to follow up with the client to:

- Ensure correct equipment was received
- Cushion and back support is appropriately adjusted
- Client is aware of correct use and maintenance of equipment

CUSHION MEASUREMENT

1. Cushion Width

It is often assumed that the cushion width should be the same as the width of the wheelchair. Although dependent on the type and model of cushion being prescribed, the width of the cushion should be determined by the width of the client. Make sure you check with the manufacturer regarding method of measurement.

Measure the client sitting in the wheelchair. If unable to do this, measure in supine with hips and knees at right angles. Taking into account that there may be extra soft tissue around the hip area, measure the distance between bony greater trochanters. This is a particularly important measurement where the cushion design relies on supporting the greater trochanters to allow immersion of the ischial tuberosities. Some cushions require measurements between the ASIS.

2. Cushion Depth

In order to maximise the seating surface ie spread the weight over as large an area as possible, the cushion should come to 2 to 3 fingerbreadths from the back of the knee. In order to achieve this measurement, you will need to measure from behind the hip to the back of the knee, then subtract the 2 or 3 fingerbreadths. This measurement can be done in side lying with hips flexed to 90 degrees or in sitting.

When determining this measurement, you also need to take into account the front frame angle of the wheelchair. This is the angle of the frame to the footplate. The greater this angle, the more the feet will be tucked back and possibly the shorter the seat depth required.

Also consider the type and design of the back upholstery or whether a solid back support is used. You need to determine whether the back support will be positioned in front or behind the wheelchair canes. This can affect the depth of the seat and where the client is positioned on the cushion. If a client has a leg length discrepancy, consider the accommodation of this eg cutting one side of the cushion at the front.

A cushion can extend 3 to 4cms past the seat depth of the wheelchair. This can be achieved by using a solid seat under the cushion for support. Some cushion bases are more sturdy than others. This feature will minimise the problem of having a wheelchair that is too long and therefore less manoeuvrable due to the size of the turning circle.

3. Cushion Height

The height of the cushion will be affected by the type and model of the cushion, the amount of contouring required in the cushion to control leg positioning and the amount of pressure redistribution required.

The height of the cushion will impact on several functional and propulsion issues:

- Client centre of gravity and height from the floor may affect balance
- The relative height of the backrest may not give adequate support
- Access to reaching the wheels for propulsion
- Access to reach the wheelchair brakes
- Height with respect to transfers
- Access under desks
- Relevant position of the footplate to provide adequate thigh support

If you are encouraging a client who has never used a cushion to add one to their wheelchair, the use of a drop down seat may assist in minimising the effect of a change in thickness and seat height.

BACK SUPPORTS

Depending on the severity of trunk deformity presenting in a client, you may be able to address the problem with commercially available back supports. A thorough postural assessment including a mat assessment needs to be done (see p11) to determine if the problem is fixed or flexible. If the problem is a flexible deformity you may be able to modify their seating equipment to allow for correction.

If there is significant fixed asymmetry that cannot be accommodated with a commercial back support, then referral to a specialised seating service is ideal where custom moulded back supports can be manufactured.

Always remember to stabilise the pelvis first by using an appropriate cushion, before attempting to correct trunk deformity.

Issues to consider when trialling and prescribing back supports for a client are:

- Does it actually make a difference to posture and provide adequate control?
- Does the client feel stable eg falling forward?
- Does the back support fit the client? Does their torso fit into the contour? Is there too much space allowing excessive movement? Is it too narrow to allow the torso to sit into the contour?
- What is the effect on function – balance, propulsion ability and reach to wheel, transfers, reaching floor
- Can the client manage to don/doff and lift the back support for placing in the car if they drive
- There may be an issue if the client uses a powerdrive wheelchair and there is insufficient lateral stability that they will favour and fall to controller side affecting posture. Long periods on the computer and use of a mouse may also encourage asymmetry.

You need to consider the features of commercial back supports to allow an individualised adjustment. Features include:

- Variable heights of supports
- Ability to adjust up/down and forward/backward from wheelchair canes
- Pelvic support
- Lumbar support
- Adjustable tilt and recline
- Ability to vary contouring and symmetry
- Modular system
- Additional lateral supports
- Need for other accessories eg headrests, forearm and hand supports

WHEELCHAIR CONSIDERATIONS

The set-up and configuration of the wheelchair can play a significant role in seating and postural control. The impact of where the client sits in relation to gravitational forces is important especially when there is significant lack of trunk muscle control.

Most wheelchairs can be adjusted to assist with postural control. This is possible in both manual and powerdrive wheelchairs. It is not the scope of this document to outline all the issues relating to wheelchairs.

When assessing a client and their equipment, look at the set-up of their wheelchair and determine if there is any issue that will assist in addressing their problem. Some of the issues to look at include:

- Seat – sling or solid base, seat length, seat plane ie variance from the horizontal
- Seat-back angle – is there recline, excessive hip flexion if angle too small
- Backrest – back height
- Height of wheelchair back canes. Especially important if fitting a commercial backrest
- Rear wheel position – dynamic posture when propelling chair, stability when resting against back support
- Armrest height if applicable
- If it is a powerdrive chair, is there adjustability in recline versus tilt-in-space (TIS)? TIS is advisable to minimise shear on skin and underlying tissue as well as maintaining neutral posture.

CUSHION FEATURES

Design and technology of pressure redistributing cushions continues to advance. This document is current at the time of production and describes general features of products rather than listing specific products on the market. When considering a cushion for a client, the prescriber needs to be aware of the features and options available with each product.

1. CUSHION TYPE OR MEDIUM

There are several types of cushion mediums available which all offer various levels of pressure relief or redistribution.

Foam (flexible polyurethane)

- Foam products are manufactured with variations in
    - Density – defined as mass of foam per unit volume and varies from low to high. Higher density allows more thickness and depth and so gives more support. It also retains its support properties for a longer period of time
    - Firmness – soft to hard. These may be used in combination where closer to the sitting surface the foam is soft to enhance comfort and body conformation whilst the base is harder to maintain shape and integrity of the cushion
- Can be cut to various shapes and sizes according to individual requirements
- Compresses with body weight over time and requires regular replacement eg every 12 months when used daily
- Permeable to moisture unless has specific seal or coating eg neoprene
- Foam with varying properties can also be used in custom design cushions which are utilised by specialist seating clinics

Latex rubber

- Tends to keep its shape better than some foam and is more durable
- Can be cut to measure in different sizes and heights

Fluid

- Fluid is described as different to water as has a higher viscosity yet weighs less than water
- Fluid can be manufactured with various components but tends to be of a consistency (viscosity) with no memory ie shape doesn't return after weight is removed
- Fluid conforms and moves with the body
- Fluid can be distributed into compartments where pressure relief needs are higher
- May need to be kneaded back into shape on a regular basis
- If the seal is damaged the fluid will leak and should not continue to be used

Gel

- Tends to have slow memory
- Can be self-sealing if the seal is broken
- Gel conforms to bony prominences and moves with the body

- Can feel cold in winter months

Air
- In an optimal situation provides significant pressure redistribution
- Tends to be more unstable for the client
- Does not provide superior pelvic positioning control
- If seal is lost, air can leak quickly and the cushion becomes flat
- Requires regular monitoring to maintain optimal air inflation
- Air inflation can be altered by temperature changes
- Air inflation and cushion pressure is altered by altitude eg during air travel
- There are alternating air cushions with pumps available

Water
- Heavy compared to other mediums
- Can be unstable for the user
- If seal is lost will leak quickly

Can feel cold in winter months

Combinations
- Many products offer a combination of mediums to achieve stability, durability and pressure redistribution. These combinations can be foam/fluid, foam/gel, foam/air etc

Specialised computerised or moulding products
- Tend to be very expensive and are often used only by specialist clinics

2. CUSHION SHAPE

The shape of a cushion can be described as linear or contoured.
- Linear is defined as having a flat surface and pressures tend to be higher at the bony prominences and also provides minimal postural stability.
- Contoured cushions are shaped around the buttocks and bony prominences in sitting and so better distribute pressure and provide postural support. They are available with varying mediums.

3. FLOTATION/IMMERSION AND BOTTOMING OUT

All cushions have varying abilities to allow flotation/immersion of the body once a client sits on them. This immersion allows maximal distribution of pressure but also must be of a depth so that the ischial tuberosities are not touching the bottom of the cushion where there is no pressure relieving medium. **This concept where the bony prominences come in contact with the base of the cushion is referred to as 'bottoming out'.**

4. MEMORY

Memory is defined as the medium's ability to return to its original shape once the weight or load has been removed. The slower the cushion returns to its normal shape the less the interface pressure between the client and the cushion. This implies a more superior pressure relieving medium. Gel has a slow memory and some fluids have no memory.

5. SHEAR REDUCTION

Shear forces are currently not measurable. Some cushion products have features that are described as shear reducing. These include:

- Low friction cushion covers minimising sliding forward
- Oversized fluid casing
- Fluid that is dynamic and moves as the body moves
- Pre-ischial bar and sacral shelf built into the foam base that maintains neutral pelvic position and helps prevent sliding

6. POSTURAL SUPPORT AND STABILITY

This feature corresponds to the shape and supportive features of the cushion. The following need to be considered:

- Ability of the cushion to promote pelvic stability and optimal positioning
- Ability to accommodate posterior pelvic tilt as this is a common problem with seated individuals
- Adequacy of thigh positioning eg built in thigh and hip supports

7. BASE SUPPORTS

Whether the cushion will be used on sling upholstery or a solid base needs to be considered. Below are some of the options available:

- Contoured or bevelled lateral edges on the underside of the cushion to compensate for the hammock effect of the sling upholstery
- Availability of a solid seat insert or rigidiser to create a more solid base
- Solid seat with adjustable drop seat option to allow a lower seat height eg for foot propulsion

8. EASE OF ACCESSORISING

To suit individual differences in client needs especially with postural issues, options are available with some products to accessorise or modify the actual cushion. Some of the more common options include:

- Ability to cut the cushion or the base without damaging integrity of the cushion eg for a leg length discrepancy
- Increasing the volume of pressure relief medium if bottoming out eg supplementary fluid pads
- Ability to widen the overall cushion without changing the pelvic base of support ie adding dummy foam to widen cushion but the pelvic well remains the same
- Accessories to accommodate or correct a deformity eg pelvic obliquity, hip flexion limitation, wind-swept deformity and thigh positioning
- Pressure relief medium specifically designed for a recline or posterior pelvic tilt posture

9. FUNCTIONAL INDEPENDENCE

Trade-offs need to be considered in seating. The therapist may focus on stability and postural control. This may impact on the client's independence and mobility and they may be reluctant to pursue this. This will need discussion with each client as to what is agreed as the major priority. Client focussed intervention is essential and some of the issues to consider are included below:

- Ease of transfers ie moving pelvis out of the cushion well
- Functional balance
- Pressure relief required
- Effect on height in wheelchair and wheelchair stability
- Effect on wheelchair propulsion

10. WEIGHT

Weight of the cushion +/- base is important in transport/handling and the ability to reposition the cushion in the chair. This needs to be considered for both the client and the carer.
Awareness of any body weight limit for the specific cushion is important with bariatric clients.

11. CONTINENCE / MOISTURE DISPERSION / CLIMATIC SUITABILITY

These are major issues with clients with SCI especially if living in tropical climates. When prescribing a cushion these are issues to consider:

- Ability to transfer moisture away from body
- Ability to dissipate body heat and allow air circulation
- Ability to allow evaporation of moisture
- Some mediums eg fluid may soften in hotter climates
- Water resistance of cushion medium if client incontinent

12. CUSHION COVER

When choosing the type of cushion cover consider:

- Should always use recommended cover for the type and model of cushion
- Should use no other object as interface between cushion, cover and client ie sheepskins, blueys etc
- Non-skid bases to maintain cushion position on the wheelchair eg during transfers
- Air exchange in tropical climates
- Promoting ease of handling of cushion eg fabric handles for carrying

13. RELIABILITY AND MAINTENANCE

This will impact on the prescribed cushion especially if the client lives in a rural/remote area. Also consider:

- Availability of replacement parts
- Does the supplier have interim loan cushions
- Ability to clean cushions and covers easily
- Anti-microbial capability especially in tropical climate
- Need for regular maintenance and whether the client/carer is able to manage this

14. WARRANTY

Warranty on cushions vary depending on cushion model and manufacturer. The client should always be aware of the warranty period and criteria in case of problems.

15. COST

Cost of the cushion and any accessories required always needs to be considered. The necessary time frame for replacement also needs to be considered when prescribing a cushion.

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Appendix 1

Name: **Date of Assessment:**

Address: **Contact No:**

Diagnosis:

Level of Injury: **I / C** **Date of Injury:**

Finance: MASS / self / DVA / CTP / Work Cover / Other ……

Reason for Review:

A. History:
Past Surgery:

Skin Breakdown:

B. Client Information:
Sensation:

Muscle Power: Upper Limbs

Lower Limbs

Continence:
Bladder Management: ICSC / IDC / SPC / tap & express / normal
Other……..
Comments:

Pain:
Site (s):

Effect:

Spasticity:

Orthotics/Prosthetics:

Height: **Weight:**

C. Function:
Pressure relieving ability:

Mobility:
□ Independent □ Assisted □ Dependent

□ Manual □ Power

Ambulation:

Transfers:
□ Independent □ Assisted □ Dependent

Method:

Seat height needed for transfer:
Special equipment and housing considerations:

Transportation:
□ Driver □ Passenger

Head Clearance: Door Inside

Other considerations:

Dressing:
□ Independent □ Assistance □ Dependent

Requirements:

Living Environment:
Type of home:

Bathroom: Kitchen:

Dining Room: Bedroom:

(Consider height of transfer surfaces, table and bench heights)

Work / Study / Recreation:

RISK LEVEL:	high / medium / low
Comments:	

D. Current Equipment

Chair:

Model:
Seat Width: Seat Depth: Back Height:
Seat Height – Ground: Seat – back angle:

Problems: □ outgrown □ disrepair □ inadequate support □ no TIS

□ doesn't accommodate limited ROM □ incorrectly prescribed

□ other ……

Cushion:

Model: Width: Depth:
Height:

Accessories: □ abductor pommel □ adductor wedges □ obliquity buildup

□ fluid supplement**s** □ incontinence cover

Problems: □ outgrown □ disrepair □ inadequate pressure redistribution

□ doesn't accommodate limited ROM □ incorrectly prescribed

□ other …….

Back Support:

Model: Width: Height:

Accessories: □ lateral supports □ lumbar support □ central pressure relief

□ adjustable recline □ removable

Problems: □ outgrown □ disrepair □ inadequate pressure relief

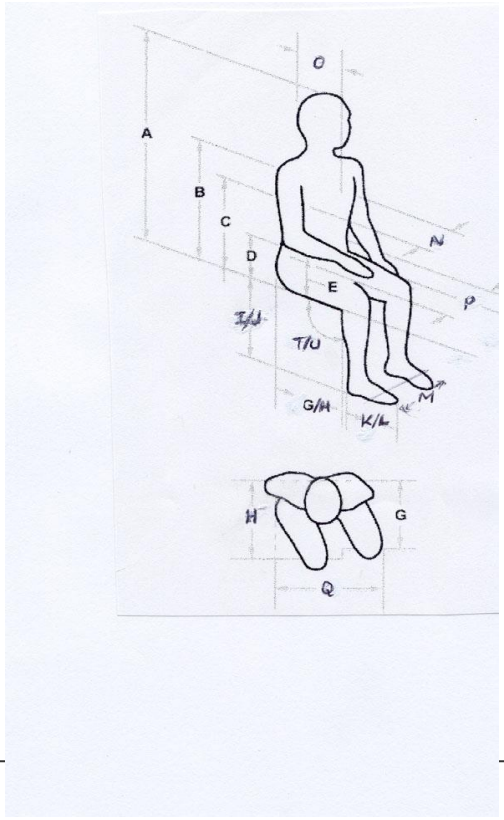
□ doesn't accommodate limited ROM □ incorrectly prescribed

□ other ……..

Other:

E. Measurements:

A seat – top of head ……..
B seat – top of shoulder ……..
C seat – inferior scapula ……..
D seat – pelvic crest ……..
E seat - inferior elbow (L) ……..
F seat - inferior elbow (R) ……..
G back of hip – back of knee (L) ……..
H back of hip – back of knee (R) ……..
I back of knee – heel (L) ……..
J back of knee – heel (R) ……..
K heel – toe incl shoe (L) ……..
L heel – toe incl shoe (R) ……..
M outside foot – outside foot ……..
N trunk width ……..
O trunk depth ……..
P grt trochanter – grt trochanter ……..
Q widest width ……..
R thigh – trunk angle (L) ……..
S thigh – trunk angle (R) ……..
T thigh – calf angle (L) ……..
U thigh – calf angle (R) ……..
V seat – floor ……..



F. Sitting Evaluation:

Pelvis: □ neutral □ posterior tilt □ anterior tilt

□ pelvic obliquity …. LHS low …. RHS low

□ rotated forward ….(L)….(R)

Head: □ neutral □ hyperextended □ forward flexed □ lateral flex ….

□ rotation …. □ fixed □ flexible □ corrects with difficulty

Shoulders: □ level □ elevated …. □ depressed ….. □ retracted ….

□ protracted …. □ fixed □ flexible □ corrects with difficulty

Limitations to ROM:

Trunk: □ neutral □ scoliosis, convex to ….. □ kyphosis ……

□ lordosis …… □ sacral sitter □ rotation ……..

Hips: □ abducted …. (L) …. (R) □ adducted ….(L) ….(R)

□ windswept □ ext rotation ….(L)….(R) □ int rotation ….(L)….(R)

Knees: □ flexed ….(L)….(R) □ extended ….(L)….(R)

Feet/Ankles: □ plantarflexion….(L)….(R) □ supination/inversion….(L)….(R)

□ pronation/eversion….(L)….(R) □ toe in….(L)….(R)

□ toe out….(L)…(R)

G. Lying Evaluation

Pelvis: □ neutral □ posterior tilt □ anterior tilt

□ pelvic obliquity **….** LHS low **….** RHS low

□ rotated forward ….(L)….(R)

□ fixed □ flexible □ corrects with difficulty

Trunk: □ neutral □ scoliosis, convex to ….. □ kyphosis ……

□ lordosis …… □ rotation rib cage ….(L)….(R) forward

□ fixed □ flexible □ corrects with difficulty

Lower Limb ROM:

Hip: □ flexion ……(L)……(R) □ extension ……(L)……(R)

□ abduction …….(L)……(R) □ adduction ……(L)……(R)

□ int rotation ……(L)……(R) □ ext rotation ……(L)…….(R)

□ SLR …….(L)……(R)

Pelvis moves at (L)……(R)..….. range of hip flexion

Knee: □ flexion …….(L)……(R) □ extension …….(L)…….(R)

Ankle: □ neutral achieved ……(L)……(R)

Limitations:

H. Summary

1. Problems

Problem	Suggested Solution

2. Action Plan

3. Any Referrals

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Review Due August 2019