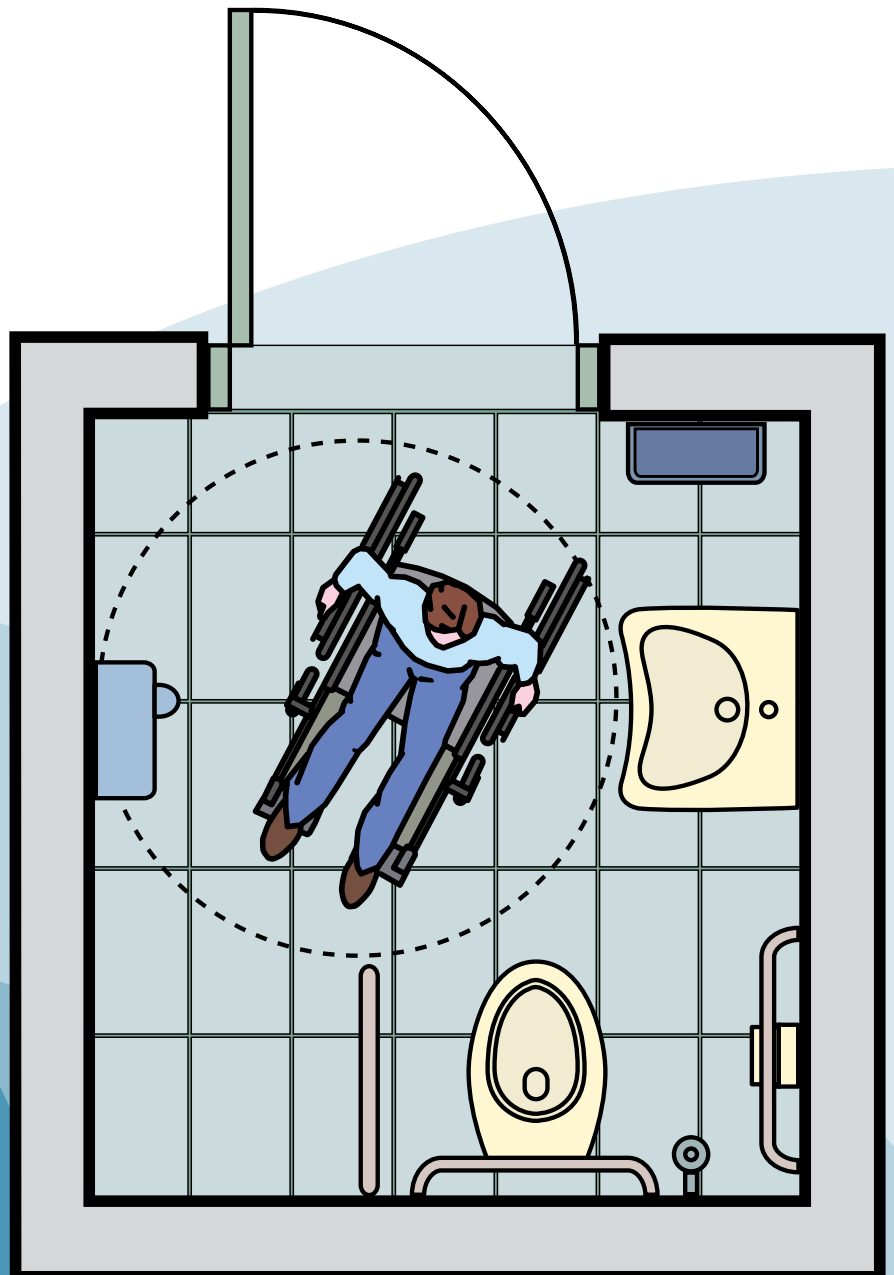




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Occupational Therapy Interventions for Adults with a Spinal Cord Injury

An overview



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First edition, 2002

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Second edition, 2014

Revision and update in 2013 was led by Anne Willey, Senior Occupational Therapist, NSW Spinal Outreach Service, and funded by the NSW Agency for Clinical Innovation.

The work by Selina Rowe, Manager, NSW Spinal Outreach Service, Royal Rehab, Ryde, and Frances Monypenny, ACI Network Manager, State Spinal Cord Injury Service, Chatswood, NSW, Australia, in coordinating and managing the project to review and update this fact sheet, one of 10 fact sheets, is acknowledged.

All recommendations are for patients with SCI as a group. Individual therapeutic decisions must be based on clinical judgment with a detailed knowledge of the individual patient's unique risks and medical history, in conjunction with this resource.

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1. INTRODUCTION

Occupational Therapy Interventions for Adults with a Spinal Cord Injury: An Overview was originally written to provide a resource for rural clinicians who worked periodically with people with a spinal cord injury (SCI). The prospect of working with these people can be daunting for clinicians if unfamiliar with this client group, as the equipment and home modifications required by them are complex.

This latest revision of the fact sheet keeps similar headings to those used in the original document and its subsequent revision; references to specific products and suppliers have been removed, as this information quickly changes. More importantly, this fact sheet attempts to provide a therapist with the tools to assess a client well, and then to make appropriate recommendations for equipment or home modifications, based on this information. It is not exhaustive, and does not cover occupational therapy management that may occur in an acute setting, yet it is hoped that it will be a useful resource for rural and metropolitan occupational therapists (OTs) alike, who have had limited opportunities to work with clients that have a spinal cord injury.

Mention should be made of two excellent websites that this group of clinicians should also find useful:

- (1) The International Spinal Cord Society has overseen the development of learning modules that provide comprehensive information on SCI management for all disciplines involved in SCI care. The occupational therapy module focuses on developing OT skills specific to SCI, and includes videos, case studies and interactive activities.¹



<http://www.elearnSCI.org>

- (2) The Spinal Cord Injury Rehabilitation Evidence (SCIRE) Project “reviews, evaluates, and translates existing research knowledge into a clear and concise format to inform health professionals and other stakeholders of best rehabilitation practices following SCI”.²



<http://www.scireproject.com>

Finally, whilst some references are specific to New South Wales (NSW) Australia, most information in this fact sheet is generic and thus has a wider application.

Disclaimer: Some of the information in the original fact sheet was not fully referenced however it has been included in this version as the expert opinion considers it is still relevant.

2. FUNCTIONAL INDEPENDENCE FOLLOWING SPINAL CORD INJURY

A person's functional independence has a major impact on their quality of life, sense of self worth and consequential social participation. Some people with a spinal cord injury (SCI) will have the ability to achieve a high level of independence while others, limited by their physical ability, will be able to achieve a level of independence through directing their care and by using technology options. Whilst it is reasonable to expect that the degree of functional independence achievable is dependent on a person's level of injury, a person's neurological level should not be viewed as strictly predictive but rather as indicative of potential function. It is important to avoid comparisons between individuals with similar levels of injury as there are many factors that have an impact on an individual's functional performance:

Factors having an impact on functional performance

- Neurological level (tetraplegia/paraplegia).
- Degree of impairment (complete or incomplete, ASIA or AIS score).
- Age at time of injury and years since injury.
- Other injuries or medical conditions (e.g. fractures, nerve injuries, cardiac disease, arthritis, etc.).
- Physique (body proportions/weight distribution).
- Cognition/motivation (impact of Traumatic Brain Injury (TBI), depression).
- Mental illness (e.g. depression, schizophrenia, personality disorder).
- Drug and alcohol abuse.
- Social supports.
- Cultural expectations.
- Financial resources.
- Environmental factors.

Musculoskeletal changes associated with ageing have a greater impact on people with a SCI and their level of independence than on the able-bodied population. Therefore a person's functional status may change as they age with a SCI. There is a complex interaction of age at injury, duration post-injury and impairment. Musculoskeletal problems with overuse syndromes are common.

See *Appendix: Potential levels of functional independence and equipment needs* for further information about the expected functional outcomes and equipment requirements for people with different levels of spinal cord injury.

3. SKIN MANAGEMENT

A person with a SCI is at risk of developing a pressure injury due to impaired sensation and muscular atrophy.

Occupational therapy intervention should occur as part of a multidisciplinary team review. It is appropriate when the person:

- has intact skin however the clinician has identified that they have a high risk of developing a pressure injury;
- is on bed rest with a pressure injury;
- has recently had a pressure injury and their skin has healed.

3.1 Occupational Therapy review

When the person with a SCI has *intact skin* yet has a high risk of developing a pressure injury the occupational therapist should:

- provide education about skin care management;
- review equipment, posture, transfers and functional ability as below.

When the person with a SCI is *on bed rest with a pressure injury* the occupational therapist should:

- inspect their skin;
- discuss possible causes of the pressure injury;
- organise an appropriate mattress;
- provide advice about positioning and bed mobility;
- examine their equipment;
- gather information about their daily routine including how functional activities are performed;
- consider care needs – to facilitate bed rest and to prepare for gradual return to seating when skin has healed.

When the *pressure injury* has healed and the person with a SCI is able to start a return to seating protocol the occupational therapist should consider the following:

- **Pressure relief**
 - Do seating surfaces provide the person with adequate pressure relief?
 - Consider wheelchair cushions, toileting & showering equipment and car cushions.
 - Is their method of pressure relief safe?
 - Consider ability to lean forward, side lean or use tilt-in-space function.
- **Seating**
 - Does the person have a symmetrical sitting posture?
 - For example, someone with a pelvic obliquity may bear more weight (and more pressure) on one ischial tuberosity than on the other.
- **Equipment**
 - Does it meet the person's needs?
 - Does it fit them well?
 - Is it well maintained?
 - Consider wheelchair & cushion, mobile shower commode, mattress, hoist & sling, car and exercise equipment.
- **Mattress**
 - Does it provide the person with adequate pressure relief?
 - Do they "bottom out" on it?

- **Transfers**

- Does the person clear all surfaces well during all transfers?
- Are their transfers level or downhill?
- If transferred with a hoist, does the person shear in the sling during transfers?
- Is the edge of the sling in contact with the healed skin?

- **Skin**

- Can the person check his/her own skin?
 - Long-handled mirrors or assistive technology, such as a web-cam, can assist. Alternatively, ensure that a carer performs regular skin checks.

- **Function**

- Has the person's level of functioning declined?

When assessing seating and sleeping surfaces it may be useful to use a system to measure interface pressure - this may require a referral to a seating clinic.

3.2 Further information



For clinical practice guidelines:

Consortium for Spinal Cord Medicine. Pressure Ulcer Prevention and Treatment Following Spinal Cord Injury: Clinical Practice Guidelines for Health Care Professionals [Internet]. 2000 [cited 2013 August 24]. Available from: <http://www.pva.org/>

Australian Wound Management Association Inc. Pan Pacific Clinical Practice Guideline for the Prevention and Management of Pressure Injury [Internet]. 2012 [cited 2013 August 24]. Available from: <http://www.awma.com.au/publications/publications.php#pipm>



For client handouts:

Consortium for Spinal Cord Medicine. Consumer Guide: Pressure Ulcers: what you should know [Internet]. 2002 [cited 2013 August 24]. Available from: <http://www.pva.org/>

Queensland Spinal Cord Injuries Service. Skin Care [Internet]. 2013 [cited 2013 August 24]. Available from: <http://www.health.qld.gov.au/qscis/html/skin-care.asp>

4. BEDROOM EQUIPMENT

4.1 Beds

4.1.1 Clinical rationale

An electrically operated bed enables a person with a SCI to change position and to adjust the height of the bed so that their transfers in/out of bed are level or downhill. Both actions help preserve shoulder function by eliminating the use of equipment such as monkey bars.

4.1.2 Client considerations

- Height and weight.
- Bed mobility.
- Method of transferring.
- Upper limb function: ability to operate controls.
- Flexibility: presence of internal “fixation hardware” may restrict movement.
- Sleeping alone or with partner.

4.1.3 Other considerations

- **Environment**
 - Where will the bed be located?
- **Compatibility with other equipment**
 - Consider mattress (length and width) and hoist (under bed clearance).
- **Geographic location**
 - What are the options for repairs and maintenance?
 - What support is available in rural areas?
- **Care requirements**
 - Does the person require hoisting or assistance with turns or personal care activities?

4.1.4 Features to consider

- *Hi-Lo function* assists a person to achieve safe functional transfers between the bed and wheelchair or commode, and it also enables the bed to be adjusted to a safe working height for carers.
- *Elevating head raise* enables independent adjustment of position.
- *Knee break* helps prevent a person from sliding down the bed and possibly shearing their skin, especially if the foot of the bed is raised so that the knees are bent prior to elevating the head raise.
- *Vascular leg raise (electric or mechanical)* enables a person with oedema to elevate their legs fully, rather than just bending at the knees.
- *Under-bed clearance* must be sufficient to enable hoist access for transfers.
- *Castor size* affects manoeuvrability of the bed – a bed moves more easily with larger castors.
- *Central locking brakes* make it easier to unlock the brakes if the bed needs to be moved frequently.

- **Width of the bed** can influence the ease of completion of personal care tasks and bed mobility. Some electric beds are available in king single, double, queen or king sizes – larger-statured people who need the extra width to turn are usually prescribed king single beds. Queen and king size beds usually have the option of a central split that would enable independent operation of the elevating head raise on each side. Consider space and carer requirements if scripting a wider bed. A partner bed – a second bed that sits alongside the other bed – is an alternative to a wider bed.
- **Bed sections vary in length** from bed to bed and may influence a person's comfort – review their anthropometrics, pain and flexibility.
- **Bed extensions** are available with some beds, and are either fitted in the middle or at the foot end of the bed – review the person's anthropometrics, pain and flexibility when considering either option.
- **Attachment sites** should be considered if a person requires an overnight drinking system, night call system or environmental control unit (ECU), and/or side rails.
- **Bed controls** can be customised so that they can be operated with any switch, and in some cases through an environmental control system. Switches that can interface with a scanning bed controller include sip and puff, joystick, rocker and toggle.
- **Side rails**, full length or clamp on, assist by bed mobility and safety.

4.2 Mattresses

4.2.1 Clinical rationale

Pressure care mattresses (“support surfaces”) are designed to reduce the interface pressure through increasing the body surface area or alternating the area in contact with the support surface.

There are two main types of mattresses – reactive and active.

A **reactive** (“constant low pressure”, [“static”, “Pressure-reducing”]) support surface can be powered or non-powered and has the ability to change its load distribution properties in response to a pressure load. [It] moulds to the [person's] shape [through] immersion and envelopment in order to redistribute body weight over a larger contact area. The interface pressure remains constant while the [person] remains in one position, but is redistributed over a wider surface area.

[An] **active** (“alternating pressure”, “Pressure-relieving”) support surface produces ... alternating pressure through mechanical means regardless of the pressure load. This is usually achieved through alternation of air pressure in support surface air cells on a programmed cycle time. This mechanism continually changes the part of the body supporting higher pressure loads.”³ (p.41)

4.2.2 Client considerations

- Pressure injury history.
- Level of injury including sensory and motor function.
- Height and weight.
- Bed mobility: Can the person change position independently?
- Method of transferring: Can the person transfer independently or is a hoist required?
- Continence management.
- Pain.

4.2.3 Assessment

An adequate trial of at least a week is essential in determining the suitability of a mattress. Once a mattress has been selected for trial, the person should lie on it for an hour or two, followed by a thorough skin check prior to sleeping on it overnight. If the trial occurs in hospital, ensure that conditions at home are simulated e.g. turns or no turns overnight.

Consider:

- **Skin**
 - Has skin integrity been maintained?
 - ▶ Pink or red skin over bony prominences indicates that the mattress is not effective.
 - Does the person 'bottom out'?
 - ▶ Assess by doing a hand check under the lowest point of the body on the mattress when the person is lying and sitting.
 - Does the mattress control friction/shear?
- **Comfort**
 - Is it comfortable?
 - Was there any effect on sleeping patterns?
- **Function**
 - Is functional status maintained e.g. bed mobility, ability to dress, self catheterise?
- **Transfers**
 - What is the impact on transfers?
 - Is the surface stable enough to maintain safe transfers?
 - Does the floor to top of mattress height interfere with transferring ability?
- **Moisture**
 - Does the mattress control moisture and temperature?
- **Noise/power source**
 - If there is a pump, can the person tolerate the noise of the pump?
 - Is there a reliable power source?
 - ▶ Consider use of uninterrupted power supply in remote areas.
- **Partner**
 - Is the mattress type and height compatible with partner's sleeping arrangements?
- **Carers**
 - Is there any impact on carers?

4.2.4 Further information



For mattress trial assessment and evaluation forms:

Queensland Spinal Cord Injuries Service. Mattress Trial Client Assessment Form [Internet]. 2013 [cited 2013 August 24]. Available from: <http://www.health.qld.gov.au/qscis/html/equipment.asp>

5. LIFTING AND TRANSFERRING EQUIPMENT

5.1 Hoists

5.1.1 Clinical rationale

An electric hoist may be required for the following reasons:

- when a person is unable to transfer due to increasing age, decrease in upper limb strength, shoulder overuse injuries, carer limitation, increased weight, frailty (of person or carer) and presence of pressure injuries
- to decrease human cost and increase quality of life for the user
- to help preserve upper limb function and reduce the risk of developing shoulder overuse injuries by reducing the number of transfers that a person performs each day
- to maintain independence – some people with low level paraplegia can transfer themselves independently using a ceiling hoist. If considering this option, it is essential that they can insert and remove the sling safely without damage to skin. A toileting sling is often used in this circumstance.

5.1.2 Client considerations

The type of hoist and sling required is dependent on the following:

- Level of injury/function.
- Age, height, weight.
- Skin integrity.
- Pain and spasm.
- Falls history.
- Psychosocial needs.
- Ability to comply with usage.
- Comfort and positioning of the person when using hoist.
- A standing hoist may be appropriate for people who have medical clearance to weight bear.

5.1.3 Other considerations

- *Environment*
 - Is there sufficient circulation space in the area where transfers take place?
 - Is there clearance for a mobile hoist under the bed?
 - Is there clearance for a mobile hoist around equipment, e.g. PWC?
 - Is there height clearance for all transfers?
 - Is the mobile hoist able to be manoeuvred easily on floor surfaces where transfers take place?
 - Is the hoist suitable for all transfers, including picking a person up from the floor?
 - Can the ceiling structure support a ceiling hoist if this is being considered?
 - A structural engineer will need to complete an assessment of the ceiling.

- **Carers**
 - Is care available?
 - What are the workplace health and safety requirements?
 - What is the carer feedback when trialling a hoist?
- **Cost**
 - Cost and available funding.

5.1.4 Options commonly prescribed

- **Hoists**
 - Mobile hoist with standard yolk or pivot frame attachment.
 - Ceiling mounted.
 - Vehicle – driver or passenger.
 - Safe working limit will vary along with hoist size.
- **Slings**
 - Type of sling determined by hoist used. General purpose slings with or without head support are generally used.
 - Various sizes are available.
- **Fabrics**
 - Generally polyester/nylon or mesh are used.

5.1.5 Custom slings

Alternatives/modifications to regular commercial slings include:

- Use of silk or sheepskin sleeves inserted over the le.g. sections of the sling to minimise shear.
- Addition of extra handles to assist a carer to position the person in the wheelchair.
- Parachute silk sling – for people with fragile skin or whose carers have difficulty inserting or removing a sling. It must not be left *in situ* whilst the person is in their wheelchair, and handles may need to be added to assist with positioning them in the wheelchair. Size may vary from conventional slings.
- Custom sling, made to measure.

5.1.6 Further information



For hoist trial assessment and evaluation forms:

Queensland Spinal Cord Injuries Service. Hoist Trial Client Assessment Form [Internet]. 2013 [cited 2013 August 24]. Available from: <http://www.health.qld.gov.au/qscis/html/equipment.asp>

5.2 Transfer boards

The transfer board is a simple device designed to assist a person to transfer, with or without assistance, to and from a wheelchair, bed, shower commode or vehicle.

When using a transfer board the person should not slide across it, rather they should do one or more lifts across the board until in the final position.

They should complete level transfers when possible, avoid positions of impingement where possible (arm internally rotated, forward flexed, and abducted), avoid placing either hand on a flat surface when a hand grip is possible during transfers, vary the technique used and the arm that leads.^{4 (p19)}

5.2.1 Clinical rationale

A transfer board may be used:

- when a person is unable to lift themselves in a single movement from one place to another
- to protect skin integrity by avoiding contact with the wheel
- to preserve shoulder function by reducing the amount of force required for lateral movement thereby lessening the chance of injury or exacerbation of pain.^{4 (p 20)}

5.2.2 Main types

- **Over-wheel slider:** A perspex board with a cut-out that enables it to fit around the wheel of the wheelchair and a plastic cover that sits above the wheel, that helps prevent the user from sitting directly on the wheel during a transfer.
- **Curved transfer board:** A board that curves around the wheel that is an alternative design to the over-wheel slider.
- **Straight transfer board:** A long wooden or perspex board used for transfers on/off a commode, in/out of a car and possibly from bed to/from power wheelchair.

5.2.3 Other options

- **Sheepskin sliding mat:** can be used to transfer a person in/out of a vehicle when they are physically unable to assist. When using this equipment two assistants are required to ensure a safe transfer.
- **Satin or silk cover:** can be fitted to a straight transfer board to provide greater skin protection during commode transfers.
- **Folded slide sheet or a slide sheet tube:** can help facilitate transfers with a transfer board.

6. MOBILITY EQUIPMENT

6.1 Wheelchairs and cushions

6.1.1 Information



For self-directed learning package:

State Spinal Cord Injury Service. Spinal Seating Professional Development Program [Internet] 2013 [cited 2013 August 24]. Available from: <http://www.aci.health.nsw.gov.au/networks/spinal-seating>



For wheelchair prescription guidelines:

EnableNSW and Lifetime Care and Support Authority. Guidelines for the prescription of a seated wheelchair or mobility scooter for people with a traumatic brain injury or spinal cord injury [Internet] Sydney: EnableNSW and Lifetime Care Support Authority (LTCSA); 2011. [cited 2013 August 24].

Available from: http://www.lifetimecare.nsw.gov.au/Spinal_Cord_Injury.aspx



For information about NSW spinal seating services and cushion user guides:

<http://www.aci.health.nsw.gov.au/networks/spinal-cord-injury/resources>



For an example of a wheelchair skills training program:

Dalhousie University. Wheelchair Skills Program [Internet]. 2012 [cited 2013 August 24].

Available from: <http://www.wheelchairskillsprogram.ca/eng/index.php>

7. HYGIENE EQUIPMENT

7.1 Mobile shower commodes

7.1.1 Clinical rationale

A mobile shower commode may be used:

- for showering and for bowel care, and can facilitate independence in these tasks
- to reduce the risk of a shoulder overuse injury associated with multiple transfers each day – by using a mobile shower commode rather than transferring on/off the toilet and on/off a shower chair each day a person can reduce the number of transfers that they do from seven to three
- to promote carer workplace health and safety when assisting a person who is dependent in self-care.

7.1.2 Client considerations

- Method of transferring.
- Length of bowel care routine.
- Level of independence with bowel care routine.
- Pressure-relieving method.
- Propulsion method.
- Skin integrity.
- Travel requirements.
- Posture – whether or not they require support.
- Medical history e.g. postural hypotension.

7.1.3 Features to consider

- **Folding frame** for ease of transport.
- **Fixed frame** for greater stability.
- **Self propulsion (2 large rear wheels)** for independent mobility; large rear wheels can also assist a carer to push the commode.
- **Attendant propulsion (4 small castors)** when a person is unable to propel themselves, or for use in small space if assistance is available to move the commode.
- **Tilt-in-space** to help manage postural hypotension, for pressure management or to stabilise posture. This is usually required by people with a high-level injury.
- **Custom-made pressure-reducing foam seat with vinyl hand-made cover** to help maintain skin integrity; the seams are underneath the seat, reducing the risk of damage to the skin.
- **Smaller aperture (distance from IT to IT + 50mm)** located towards the rear of the seat (50mm from the back of the seat) recommended to promote neutral position of pelvis, to help prevent pelvic rotation and to reduce pressure around the coccyx area.
- **Extended aperture** to accommodate male genitalia.
- **Additional padding around aperture** to help maintain skin integrity.
- **Cut-outs (full at front or rear, or partial at sides)** for ease of access for bowel care.
- **Seat-to-back rest angle** (usually 3°) can be increased to 5° or 7° to enhance posture or to accommodate spasm.

- *Padded backrest* may be required for greater comfort or pressure management.
- *Higher back rest or removable backrest extension* (one and two strap extensions available) is usually required by people with a high-level injury.
- *Headrest* for those with little or no head control.
- *Arm rest supports (e.g. troughs)* for upper limb positioning and protection.
- *Push handles at the rear of the backrest* may assist a person to maintain balance by hooking an elbow over the handle.
- *Foot plate angle and orientation* can be adjusted to accommodate musculature changes/lower limb position.
- *Elevating leg rests with calf support* for management of oedema.
- *Padded leg rests* for improved pressure management of lower limbs.
- *Anti-tip bars* to enhance safety.
- *Pan and pan carrier* if a person is unable to access the toilet.

Commode seats

The seat is the most important part of the mobile shower commode. In order to maintain good pressure care, the seat is designed to distribute as much pressure through the greater trochanters (GTs) and thighs as possible whilst the ischial tuberosities (ITs) “float” in the aperture and therefore remain free from pressure. NB Accommodation will need to be made if there is a history of GT pressure injuries.

A double foam-layered seat with foam wrapped around the inside edge of the aperture is also recommended for enhanced pressure care.

A consultation or an assessment with the supplier is recommended for custom commode seats.

If a custom commode seat does not provide adequate pressure care, cushions can be added to the seat, such as an air-filled commode cushion or a padded gel cushion.

7.1.4 Further information



For assessment tool and templates for hand-made shower commode seats:

Queensland Spinal Cord Injuries Service. Mobile Shower Commode Client Assessment Form [Internet]. 2013 [cited 2013 August 24]. Available from: <http://www.health.qld.gov.au/qscis/html/equipment.asp>

7.2 Other showering/toileting equipment

7.2.1 Clinical rationale

Whilst a mobile shower commode is usually recommended for hygiene tasks, there are circumstances where alternative equipment may be considered for a person who does sideways transfers. These include living in temporary accommodation and travel. The absence of shoulder pathology is essential and the increased risk of shoulder overuse injuries should be considered when prescribing this equipment.

7.2.2 Options

- Padded transfer bench for use in shower recess or over bath.
- Shower chair/stool with or without armrests and a padded seat or cushion.
- Bath board: consider whether cushion required for pressure management.
- Padded toilet seat.
- Low profile commode cushions e.g. air or gel.
- Portable toilet seat cushions.
- Shower trolley.

8. ASSISTIVE TECHNOLOGY (COMPUTERS, ECUs, COMMUNICATION)

8.1 Computers

Many commercial items of technology can be adapted to enhance access e.g. tablet computers. Computers are a useful tool for communication, study, vocational opportunities and domestic duties (such as internet shopping and banking).

Computer equipment that is commonly used by people with a SCI includes: modified mouse e.g. trackball, on-screen keyboard, voice-activated software, tablet and smart phone.

8.1.1 Information



Information, advice and support for clinicians & clients:

Ability Technology:

<http://www.ability.org.au/solutions/assistive-technology> [cited 2013 August 24]

Northcott Computer Assistive Technology Services: <https://www.northcott.com.au/services/assistive-technology> [cited 2013 August 24]

Cerebral Palsy Alliance: <https://www.cerebralpalsy.org.au/services/therapy-health-and-sport/> [cited 2013 August 24]

Australian Rehabilitation & Assistive Technology Association: www.arata.org.au [cited 2013 August 24]



Suppliers who provide clinician support:

Technical Solutions: <http://tecsol.com.au/cms123/> [cited 2013 August 24]



Courses that support students with a disability to learn computer skills in NSW:

www.oten.edu.au [cited 2013 August 24]

8.2 Environmental Control Units

8.2.1 Clinical rationale

- Environmental Control Units (ECUs) aim to increase the level of independence in the home environment. Domestic appliances are controlled using a single switch or a voice command input into the ECU, which sends an output command to the appliance to operate as required. Devices controlled may include lamps, lights, air conditioners, heaters, televisions, videos, stereos, electric doors, electric beds, computers and telephones.
- The number and type of devices that a person wants to operate will determine whether they require a simple or more complex ECU.
- Various switch options exist including systems that are activated through a person's power wheelchair.
- ECUs should be trialled before purchase and should meet the individual needs of the person. People eligible for assistance from EnableNSW can now trial products.

8.2.2 Assessment

Joy Zabala, an educator, has developed the SETT framework for use when considering a person's assistive technology requirements. Understanding a person's abilities and requirements is essential before considering appropriate assistive technology.

- **Student/Self** – information relating specifically to the person who will be using the technology
 - What is the functional area of concern?
 - What does the person need to be able to do that is difficult or impossible to do independently at this time?
- **Environment** – information related to anything or anyone in places where the technology is expected to be used:
 - What are the supports and barriers in the person's usual environments?
- **Task** – information about what actually happens in the environment:
 - What are the specific things that the person needs to do to be involved actively in their environment?
- **Tools** – tools (devices, services and strategies) that are needed to help a person participate actively in their environment:
 - What needs to be included when developing a system of assistive technology tools for a [person] with these needs and abilities, doing these tasks in these environments?^(5,6)

8.2.3 Further Information



For interactive website with technology options for operation of appliances at home:

Ability House <http://abilityhouse.org.au/> [cited 2013 August 24]



For clinician information, advice and support:

Ability Technology: <http://www.ability.org.au/> [cited 2013 August 24]



For further information about the SETT framework:

Joy Zabala: <http://www.joyzabala.com/> [cited 2013 August 24]



For information about EnableNSW Environmental Control and Computer Access Systems Pilot:

<http://www.enable.health.nsw.gov.au/home/services/ecs> [cited 2013 August 24]

8.3 Emergency call systems

8.3.1 Clinical rationale

- An emergency call system provides a person with a system where they can call for assistance at any time, helping alleviate any anxiety when alone and encouraging independence.
- Some people prefer to use a mobile phone for this purpose although there will be situations when a mobile phone cannot be used.

8.3.2 Options

- There are monitored and non-monitored types.
- The transmitter can often be adapted to suit the individual needs of the person, depending on their level of injury. For example, at least one company can provide sip/puff and large switch adaptations.
- If the transmitter requires individual specifications, it is suggested that an occupational therapist coordinate/consult between the manufacturer and an organisation such as TAD (Technical Aid to the Disabled).
- People in rural areas may require additional customisation to offer longer range.

Further information



For emergency call system options and suppliers:

Independent Living Centre NSW <http://www.ilcnsw.asn.au/> [cited 2013 August 24]

9. SPLINTS

9.1 Clinical rationale

- The provision of upper limb (UL) splints is common practice in spinal injury units. Splints can be applied for a variety of clinical reasons, depending on the cervical lesion level. Not all people are discharged with an UL splint, and may be discharged with a passive range of movement program. Most people need to be assessed on an individual basis and reviewed if there are any changes in their hand, e.g. if contractures start to develop.
- In most cases for people with a C4 lesion and above, a resting hand splint will be used at night. This splint is designed to prevent contractures and maintain comesis. It places the hand in a position of rest or function and is also often worn by people with C5 and C6 lesions at night.
- For most people with a C5 lesion where they have weak or no active wrist extension, a wrist cock-up brace is used during the day to stabilise the wrist and thus increase function. These can be commercially available splints or a custom-made leather or thermoplastic splint.
- Writing splints and typing splints, made of thermoplastic may be indicated. Contact a spinal unit to request a pattern. A range of splints are also commercially available if required.
- Wheelchair gloves or push mitts prevent skin breakdown and may be essential for effective wheelchair propulsion. These can be padded bicycle gloves, or commercially available wheelchair gloves from health product suppliers. A person with tetraplegia may find that commercially supplied gloves are not suitable as the thumb position can affect a tenodesis grasp. Individual assessment is essential.

10. OTHER EQUIPMENT

10.1 Home management

10.1.1 Clinical rationale

To maximise the independence of a person with a SCI, it is essential to modify the home to meet an individual's needs – see home modifications section.

10.1.2 Options

A number of products are commercially available that facilitate independence in the performance of home management tasks. The products are especially useful for those people with tetraplegia who have limited hand function. Examples include: chopping board with attached knife & spikes, large-handled knives/utensils, peeler with table clamp, jar openers, kettle tippers, reaching aids, long-handled dustpans & brooms, built-up pens and utensils.

Traymobiles and stable tables can be used to transport items or carry hot items to reduce the risk of burns on lower limbs.

A front-loading washing machine, and a lowered clothesline or front-loading dryer can facilitate independence in laundry tasks.

10.1.3 Further information



For product options and suppliers:

Independent Living Centre NSW: <http://www.ilcnsw.asn.au/> [cited 2013 August 24]

11. HOME MODIFICATIONS

The home visit process is different for each individual, depending on need, housing situation prior to injury and compensation status. It can also be difficult to ascertain the expected functional level upon discharge for people with an incomplete lesion. For people with a complete spinal cord lesion, where the anticipated functional outcome can fairly accurately be anticipated, the home visit process can be started at an earlier time in their rehabilitation.

11.1 Information



For guidelines based on Australian Standards and with additional information based on the experiences of spinal occupational therapists:

NSW Occupational Therapy Spinal Practitioners' Group. Occupational Therapy Guidelines for modifications to dwellings of clients with spinal cord injuries [Internet]. 2007 [updated 2010; cited 2013 August 24].

Available from: <http://www.aci.health.nsw.gov.au/networks/spinal-cord-injury/resources>



For evidence based best practice in home modifications:

Home Modification Information Clearinghouse: <http://www.homemods.info/> [cited 2013 August 24]



For fact sheets and templates:

NSW Home Modification & Maintenance Services State Council: <http://www.nswhmms.org.au/> [cited 2013 August 24]







For guidelines, access and prioritisation and fees policies in NSW:

http://www.adhc.nsw.gov.au/sp/delivering_hacc_services/home_modification_reforms [cited 2013 August 24]

12. WORK

There are a number of services available that provide vocational counselling, rehabilitation and work retraining, and assistance with finding employment.



12.1 Information

-  For information and advice about employment of people with a disability:
Job Access: <http://www.jobaccess.gov.au/content/disability-work> [cited 2013 August 24]
-  For consumer website:
Victorian Spinal Cord Injury Service. Why Work [Internet] 2013 [cited 2013 August 24].
Available from: http://www.spinalhub.com.au/work-leisure/work/article/Why_work
-  For network of disabled and injured farmers and successful farm modifications:
AgrAbility Australia: <http://www.aghealth.org.au/index.php?id=5058> [cited 2013 August 24]
-  For assistive technology solutions for farmers, ranchers and other agricultural workers (US) with a disability: The Toolbox: Agricultural Tools, Equipment, Machinery & Buildings for Farmers and Ranchers with Physical Disabilities: <http://www.agrability.org/Toolbox/index.cfm> [cited 2013 August 24]

13. LEISURE


Recreation and leisure activities assist people to not only pursue their individual talents, abilities and interest but also to develop many important relationships and social networks in the broader community.

13.1 Information

-  Online Arts, Leisure, Health and Sport Guide:
<http://www.d-ability.org/> [cited 2013 August 24]
-  NSW State Spinal Cord Injury Service. Directory of Information and Support. [Internet] 2009 [cited 2013 August 24]. Available from: <http://www.aci.health.nsw.gov.au/networks/spinal-cord-injury/resources>

14. DRIVING, CAR MODIFICATION AND TRANSPORT

14.1 Information

-  NSW State Spinal Cord Injury Service. Directory of Information and Support. [Internet] 2009 [cited 2013 August 24]. Available from: <http://www.aci.health.nsw.gov.au/networks/spinal-cord-injury/resources>

APPENDIX 1: POTENTIAL LEVELS OF FUNCTIONAL INDEPENDENCE AND EQUIPMENT NEEDS

The following tables have been adapted from those developed by the Consortium for Spinal Cord Medicine.⁷ They are neither exhaustive nor prescriptive, and refer to complete injuries, rather than incomplete injuries. In addition, as every person with a SCI will have different factors contributing to their functional requirements, they need to be individually assessed. It is essential that each person is assessed in their own environment or replica.

Table 1: C1-4 Complete neurological level

Task/Activity	Expected Functional Outcome	Equipment
Pressure-relieving/positioning	Total assist; may be independent with equipment	<ul style="list-style-type: none"> • Power wheelchair with tilt-in-space, postural support and head control systems. • Pressure-reducing cushion. • Pressure-relieving mattress. • Resting splints for overnight use; may use soft wrist cock-up braces during the day.
Bed mobility	Total assist	<ul style="list-style-type: none"> • Electric Hi-Lo bed with elevating back raise, knee break and side rails. • Scanning bed controller with sip/puff switch for independent operation. • Trendelenberg option may be required to assist with positioning.
Transfers	Total assist	<ul style="list-style-type: none"> • Electric hoist with sling.
Mobility	Manual: Total assist Power: Independent with highly specialised equipment	<ul style="list-style-type: none"> • Lightweight manual wheelchair with tilt-in-space, postural supports and headrest. High back may be indicated. • Power wheelchair with tilt-in-space, ventilator tray (for C1-C3), and specialist positioning and control equipment.
Toileting	Total assist	<ul style="list-style-type: none"> • Mobile shower commode with custom padded seat, tilt-in-space, arm troughs for support, head rest (for C1-3); may also require lateral supports.
Showering	Total assist	<ul style="list-style-type: none"> • Mobile shower commode as above. • Handheld shower.
Dressing	Total assist	n/a
Grooming	Total assist	n/a
Eating/feeding	Total assist; may achieve independence with equipment	<ul style="list-style-type: none"> • Drinking system attached to power wheelchair and bed.
Transport	Total assist	<ul style="list-style-type: none"> • Van with modified access and appropriate docking/tie-down system.
Domestic tasks	Total assist	n/a
Assistive technology		<ul style="list-style-type: none"> • Environmental Control Unit.

Table 2: C5 Complete neurological level

Task/Activity	Expected Functional Outcome	Equipment
Pressure-relieving/positioning	Total assist; may be independent with equipment	<ul style="list-style-type: none"> • Power wheelchair with tilt-in-space, postural support and head control systems. • Pressure-reducing cushion. • Pressure-relieving mattress. • Resting splints for overnight use; may use soft wrist cock-up braces during the day.
Bed Mobility	Total assist	<ul style="list-style-type: none"> • Electric Hi/Lo bed with side rails. • Trendelenberg option may be required to assist with positioning.
Transfers	Total assist	<ul style="list-style-type: none"> • Electric hoist with sling.
Mobility	Manual: Independent to some assistance (dependent on ground and floor surface). Power: Independent with highly specialised equipment	<ul style="list-style-type: none"> • Lightweight rigid or folding frame manual wheelchair with modified push rims and push mitts. • Power wheelchair with tilt-in-space, head rest and specialised hand control (with wrist cock-up splint as required).
Toileting	Total assist	<ul style="list-style-type: none"> • Mobile shower commode with custom padded seat. • May require tilt-in-space function and padded armrests.
Showering	Total assist	<ul style="list-style-type: none"> • Mobile shower commode as above. • Handheld shower in cuff.
Dressing	Lower: Total assist Upper: Moderate assist	<ul style="list-style-type: none"> • Adaptive techniques and equipment (e.g. ring pull zippers and clothing loops).
Grooming	Moderate to total assist	<ul style="list-style-type: none"> • Adaptive techniques and equipment (e.g. palmar band/ universal cuff).
Eating/feeding	Total assist for set up, then independent eating with equipment	<ul style="list-style-type: none"> • Wrist cock-up brace. • Adaptive feeding equipment (e.g. palmar band/ universal cuff, ringed cutlery). • Drinking system/ drink bottle with C-clips.
Transport	Independent driving with highly specialised equipment Assistance with transfers and wheelchair transport required if not driving a fully modified van	<ul style="list-style-type: none"> • Van with modified access and appropriate docking/ tie-down system.
Domestic assistance	Total assist	n/a
Assistive technology		<ul style="list-style-type: none"> • Technology to operate home appliances.

Table 3: C6 Complete neurological level

Task/Activity	Expected Functional Outcome	Equipment
Pressure-relieving/positioning	Moderate to total assist; may be independent with equipment	<ul style="list-style-type: none"> • Power wheelchair with tilt-in-space. • Postural support equipment. • Pressure-reducing cushion. • Pressure-relieving mattress or overlay. • Thumb post splint may be useful for positioning thumb when using tenodesis action.
Bed mobility	Moderate to total assist	<ul style="list-style-type: none"> • Electric Hi-Lo bed with side rails.
Transfers	Moderate to total assist may be independent with equipment	<ul style="list-style-type: none"> • Electric hoist recommended. • Assisted sliding board transfer may be possible.
Mobility	Manual: Independent to total assist -depending on ground and floor surface Power: Independent	<ul style="list-style-type: none"> • Lightweight rigid or folding frame manual wheelchair with modified push rims (e.g. rubber coated or larger diameter rims) and push mitts. • Power wheelchair with hand control, power tilt-in-space. • Headrest for transport.
Toileting	Total assist	<ul style="list-style-type: none"> • Mobile shower commode with custom padded seat. • May require increased seat-to-back rest angle and/or padded arm rests.
Showering	Moderate to total assist	<ul style="list-style-type: none"> • Mobile shower commode as above. • Handheld shower. • Equipment (e.g. soap mitt, long-handled brush).
Dressing	Lower: Moderate to total assist Upper: Moderate assist to independent	<ul style="list-style-type: none"> • Adaptive techniques and equipment (e.g. clothing loops, ring pull zipper).
Grooming	Minimal to total assist	<ul style="list-style-type: none"> • Adaptive techniques and equipment (e.g. C-clip, palmar band/universal cuff, built-up toothbrush, long-handled aids).
Eating/feeding	Moderate to total assist for set up, then independent with equipment	<ul style="list-style-type: none"> • Adaptive feeding equipment and techniques (palmar band/universal cuff, ringed cutlery, drinking bottle with C-clips stable table).
Transport	Independent driving from wheelchair or from vehicle seat	<ul style="list-style-type: none"> • Modified self-drive van with wheelchair power lockdowns. • Hand controls to drive, adaptive technique to transfer self and chair into vehicle or with chair hoist (e.g. slide board with sheepskin).
Domestic assistance	Moderate to total assist	<ul style="list-style-type: none"> • May be able to complete basic tasks with modified methods or equipment.

Table 4: C7-8 Complete neurological level

Task/Activity	Expected Functional Outcome	Equipment
Pressure-relieving/positioning	Minimal assist to independent	<ul style="list-style-type: none"> • Pressure-reducing cushion. • Postural support equipment e.g. lateral supports. • Pressure-relieving mattress or overlay.
Bed mobility	Moderate assist to independent	<ul style="list-style-type: none"> • Electric Hi-Lo bed recommended; rails may be required. • King single or larger ensemble bed may be used.
Transfers	Minimal assist to independent	<ul style="list-style-type: none"> • With or without transfer board.
Mobility	Manual: Independent on flat and even surfaces; variable assistance on uneven ground Power: Independent	<ul style="list-style-type: none"> • Lightweight rigid or folding frame manual wheelchair with modified push rims (e.g. rubber-coated rims) • Power wheelchair recommended for long distances/outdoor mobility.
Toileting	Minimal assist to independent	<ul style="list-style-type: none"> • Mobile shower commode with custom padded seat with full or partial side cut out for access. • Adaptive equipment may be useful (e.g. suppository inserter).
Showering	Minimal assist to independent	<ul style="list-style-type: none"> • Mobile shower commode as above recommended. • Shower chair without armrests with padded seat cushion. • Handheld shower.
Dressing	Minimal assist to independent	<ul style="list-style-type: none"> • With or without adaptive techniques and equipment.
Grooming	Independent	<ul style="list-style-type: none"> • With or without adaptive techniques and equipment (e.g. built-up handles).
Eating/feeding	Independent	<ul style="list-style-type: none"> • With or without adaptive equipment and techniques (e.g. ringed or built-up cutlery).
Transport	Independent driving from wheelchair or in vehicle	<ul style="list-style-type: none"> • Hand controls to drive, adaptive technique to transfer self and chair into vehicle or with chair hoist.
Domestic assistance	Moderate to total assist	<ul style="list-style-type: none"> • Adaptive equipment (e.g. long-handled aids, built-up handles, specific kitchen appliances) and environmental modifications.

Table 5: T1-9 Complete neurological level

Task/Activity	Expected Functional Outcome	Equipment
Pressure-relieving/positioning	Independent	<ul style="list-style-type: none"> • Pressure-reducing cushion. • Postural support equipment. • Pressure-relieving mattress or overlay.
Bed mobility	Independent	<ul style="list-style-type: none"> • Electric Hi-Lo bed may be indicated or ensemble bed. • Side rails may be required.
Transfers	Independent	<ul style="list-style-type: none"> • With or without transfer board.
Mobility	Independent Good-to-excellent wheelchair skills (e.g. wheel stands)	<ul style="list-style-type: none"> • Ultra lightweight rigid or folding frame manual wheelchair.
Toileting	Independent	<ul style="list-style-type: none"> • Mobile shower commode with custom padded seat with full or partial side cut out for access recommended. • Over-toilet aid with padded seat. • Padded toilet seat.
Showering	Independent	<ul style="list-style-type: none"> • Mobile shower commode as above. • Shower chair without armrests with padded seat cushion. • Handheld shower.
Dressing	Independent	<ul style="list-style-type: none"> • Adaptive techniques (e.g. log rolling and long sitting for lower limb dressing).
Grooming	Independent	<ul style="list-style-type: none"> • n/a
Eating / feeding	Independent	<ul style="list-style-type: none"> • n/a
Transport	Independent driving in vehicle	<ul style="list-style-type: none"> • Hand controls to drive, adaptive technique to transfer self and chair into vehicle or wheelchair hoist to stow.
Domestic duties	Minimal to moderate assist	<ul style="list-style-type: none"> • Adaptive equipment (e.g. long-handled brush and broom, reaching aid), specific kitchen appliances, and environmental modifications.

Table 6: T10-L1 Complete neurological level

Task/Activity	Expected Functional Outcome	Equipment
Pressure-relieving/positioning	Independent	<ul style="list-style-type: none"> • Pressure-reducing cushion. • Postural support equipment. • Pressure-relieving mattress or overlay.
Bed mobility	Independent	<ul style="list-style-type: none"> • Electric Hi-Lo bed may be indicated or ensemble bed.
Transfers	Independent	<ul style="list-style-type: none"> • With or without transfer board.
Mobility	Independent	<ul style="list-style-type: none"> • Ultra lightweight rigid or folding frame manual wheelchair.
Toileting	Independent	<ul style="list-style-type: none"> • Mobile shower commode with custom padded seat with full or partial side cut out for access recommended. • Over-toilet aid with padded seat. • Padded toilet seat.
Showering	Independent	<ul style="list-style-type: none"> • Mobile shower commode as above recommended • Shower chair without arms and with a padded cushion. • Padded transfer bench. • Handheld shower.
Dressing	Independent	<ul style="list-style-type: none"> • Adaptive techniques (e.g. log rolling and long sitting for lower limb dressing).
Grooming	Independent	<ul style="list-style-type: none"> • n/a
Eating/Feeding	Independent	<ul style="list-style-type: none"> • n/a
Transport	Independent driving in vehicle	<ul style="list-style-type: none"> • Hand controls to drive, adaptive technique to transfer self and chair into vehicle or with chair hoist.
Domestic assistance	Minimal assist	<ul style="list-style-type: none"> • Adaptive equipment (e.g. long-handled brush and broom, reaching aid), specific kitchen appliances and environmental modifications.

Table 7: L1-S5 Neurological level

Task/Activity	Expected Functional Outcome	Equipment
Pressure-relieving/ Positioning	Independent	<ul style="list-style-type: none"> • Pressure-reducing cushion. • Postural support equipment as indicated.
Bed mobility	Independent	<ul style="list-style-type: none"> • Ensemble bed.
Transfers	Independent	<ul style="list-style-type: none"> • With or without transfer board.
Mobility	Independent	<ul style="list-style-type: none"> • Ultra lightweight rigid or folding frame wheelchair.
Toileting	Independent	<ul style="list-style-type: none"> • Mobile shower commode with custom padded seat with full or partial side cut out for access recommended. • Over-toilet aid with custom padded seat Padded toilet seat.
Showering	Independent	<ul style="list-style-type: none"> • Mobile shower commode as above recommended. • Shower chair without armrests with padded seat cushion. • Handheld shower.
Dressing	Independent	<ul style="list-style-type: none"> • Adaptive techniques.
Grooming	Independent	<ul style="list-style-type: none"> • n/a
Eating/feeding	Independent	<ul style="list-style-type: none"> • n/a
Transport	Independent driving in vehicle	<ul style="list-style-type: none"> • Hand controls to drive, adaptive technique to transfer self and chair into vehicle or with chair hoist.
Domestic duties	Minimal assistance	<ul style="list-style-type: none"> • Adaptive equipment (e.g. long-handled brush and broom, reaching aid), specific kitchen appliances and environmental modifications.

 For more detailed information:

Motor Accidents Authority of New South Wales and Lifetime Care and Support Authority of New South Wales. Guidelines for levels of attendant care for people with spinal cord injury [Internet]. 2007 [cited 2013 August 24]. Available from: http://www.lifetimecare.nsw.gov.au/guidelines_and_policies_for_professionals.aspx

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