



Health Maintenance Tool

Module 4: The skin and its associated problems

How to stay healthy and well with a spinal cord injury
A tool for consumers from consumers

A product of the SCI Wellness Project

A collaborative project between

Funded by



THE UNIVERSITY OF
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Royal Rehab
Empowering Independence



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DISCLAIMER

The strategies outlined in this module are provided for general information only. The module aims to help you work together with your doctor and health professional team to develop an effective self-management program, which best suits your living situation and maintains your health, independence, and quality of life. Clinical advice specific to your spinal cord injury, personal circumstances and lifestyle should be directed to the appropriate health professionals and services with the skills and expertise in managing people with spinal cord injury.

Foreword

The Health Maintenance Tool is a guide to help you understand and troubleshoot problems you may experience throughout your spinal cord injury journey.

Being a paraplegic for the last 34 years, I have learnt you can never have too many resources or information on hand to improve your knowledge and help you manage health issues associated with your spinal cord injury.

Health issues can pop up when least expected. The Health Maintenance Tool will prove to be an invaluable resource for you to find sound advice, take preventative measures and resolve issues related to your spinal cord injury as well as maintain your health and wellbeing.

– Tanya Fitch, Consumer with spinal cord injury

Spinal cord injury is associated with many challenges following injury. It is therefore important for people with spinal cord injury to self-manage their health-related needs and become the experts of their own care. People with spinal cord injury have complex health needs, not only following their spinal cord injury, but throughout their life. Here at icare we have been privileged to be involved in the development of the Health Maintenance Tool to empower people by providing guidance and recommendations for people to timely and proactively manage their spinal cord injury beyond the early days in the spinal injury unit.

The Health Maintenance Tool has been developed by people with spinal cord injury, GPs and expert clinicians to provide consistent evidence-based information to support proactive management of the health needs of people with spinal cord injury. It guides spinal cord injury-specific health maintenance in the following six areas: mental health, bladder, bowel, skin, pain and autonomic dysreflexia. The tool is easy to navigate and helps people understand common and potential issues, what's normal and what to look out for, lists recommended routine investigations, explains when to seek assistance and provides self-management tips.

Ultimately, we hope the Health Maintenance Tool empowers people with spinal cord injury to expertly and proactively manage their health needs leading to improved quality of life and health outcomes. I recommend this tool to those living with spinal cord injury and those who care and support them, their clinicians and their GPs.

– Suzanne Lulham, General Manager, Lifetime Schemes, icare NSW

Background

The Spinal Cord Injury Health Maintenance Tool

The Spinal Cord Injury Health Maintenance Tool (SCI-HMT) is a guide to help you understand and troubleshoot problems you may experience throughout your journey after your spinal cord injury. It is important for you to learn how to self-manage your health-related needs. Understanding your body, health and wellbeing and how to prevent potential health issues, will empower you to become an expert in your own care.

This tool has been developed by people with spinal cord injury, general practitioners and expert clinicians. The SCI-HMT provides evidence-based information, tips and tools to help you to proactively manage your health in six key areas – mental health, bladder, bowel, skin, pain and autonomic dysreflexia.

Behind the Spinal Cord Injury Health Maintenance Tool

The SCI-HMT is a product of the SCI Wellness Project*, based on the recommendation from a rural spinal cord injury clinic evaluation (2015) to develop a consumer-friendly Health Maintenance Tool supporting self-management. The content of the SCI-HMT was informed by up-to-date best-practice research and consumers' perceptions about their health. The tool is freely accessible to consumers with spinal cord injury, family members, carers and health professionals.

*The SCI Wellness Project consisted of two phases.

- Phase 1 (2018-2020) involved development of a pdf version (soft and hard copy) of the Health Maintenance Tool. The first phase was a collaborative project between the John Walsh Centre for Rehabilitation Research (The University of Sydney) and Royal Rehab, with financial support from Insurance and Care (icare) NSW.
- Phase 2 (2021-2023) involved development of a digital solution (website and a standalone app) of the Health Maintenance Tool. The second phase was a collaborative project between the John Walsh Centre for Rehabilitation Research (The University of Sydney), Royal Rehab and NSW Agency for Clinical Innovation, with financial support from Insurance and Care (icare) NSW.

“Well, I guess the number one motivation for taking care of my health is that I want to live a long life.”

– Consumer with spinal cord injury

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Summary of findings

from the 2015 Rural Spinal Cord Injury Project

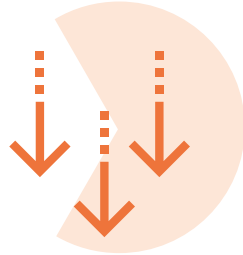
The project involved

681

people with spinal cord injury living in rural NSW

One third

of people with spinal cord injury had one or more current pressure injuries



Pressure injuries are most common between

21-30 years post-injury

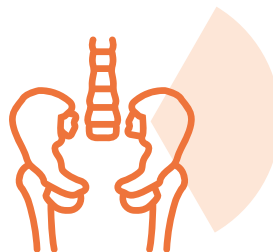
One quarter

of individuals reported having other skin-related problems, such as skin rashes and dermatitis, venous/arterial ulcers, infection (osteomyelitis and cellulitis), sinus and ingrown toenails



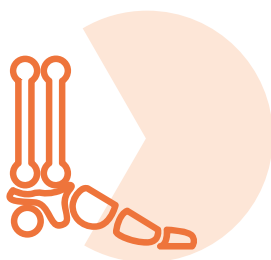
Two thirds

of pressure injuries were located over the ischial tuberosities (sitting bones), sacrum and greater trochanters (bone at side of hip)



One third

of individuals had pressure injuries over the region of the ankle or foot



How to navigate this module

KNOW Your skin and spinal cord injury (page 5)

CHECK Do you have a problem with your skin?
Refer to warning signs (page 8)

✓ Yes

✗ No

IDENTIFY PROBLEM
Look for important signs and symptoms:
Pressure injury (page 12)
Other problems (pages 26 - 27)

OBSERVE
Refer to questions in warning signs

PREVENT
Refer to:
Self-management tips (page 10)
Take home messages (page 32)

CHECK SEVERITY
Based on the management index:
Severity scale (page 29)
Interference scale (page 30)

EDUCATE
Refer to skin management toolbox (page 12)

MANAGE
Based on problem severity and interference (pages 29-30)

Self-manage without support

Self-manage with support from your GP or other healthcare professional

Manage with specialist support

Is this problem resolved? Have your goals been met?

What will happen if you do not manage your problem 'just-in-time'? (page 31)

✗ No

✓ Yes

RE-ASSESS

OBSERVE/PREVENT

Know about your skin

How the skin normally works

Your skin is your body's largest organ. It serves as a protective barrier against most external agents like infection, dirt and harmful rays from the sun. It permits the senses of touch, pain, heat and cold to travel from the nerve endings in your skin to your brain through the spinal cord and helps regulate your body temperature.

Your skin regulates your body temperature through the dilation and constriction of blood vessels and the process of sweating.

When you're in cold weather, your skin signals your blood vessels to constrict and keep you as warm as possible.

When you're in hot and/or humid weather, your skin signals blood vessels to relax and triggers sweat glands under your skin to produce water and salt which in turn increases sweating. This process cools you down as the water evaporates from your skin.

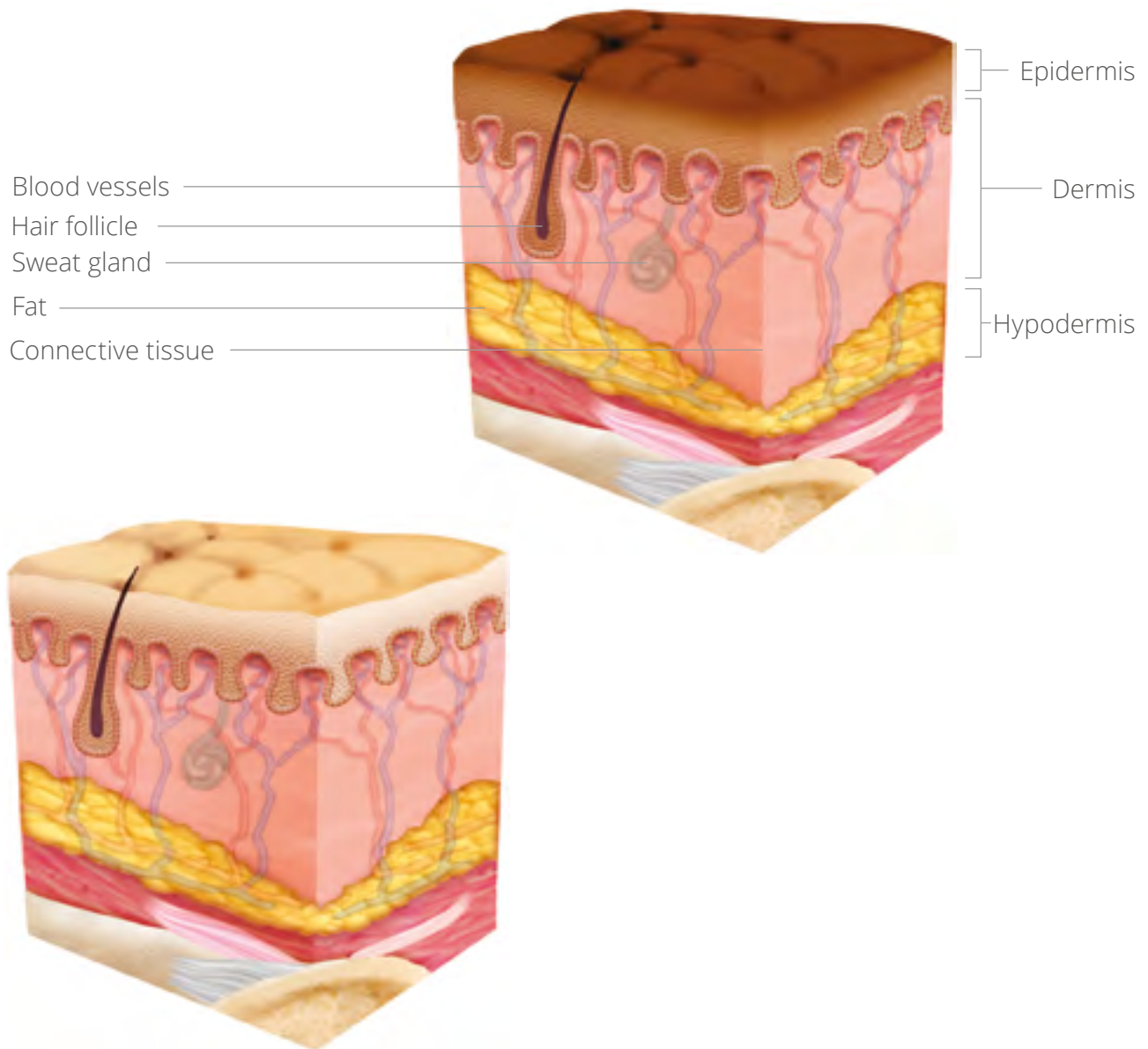


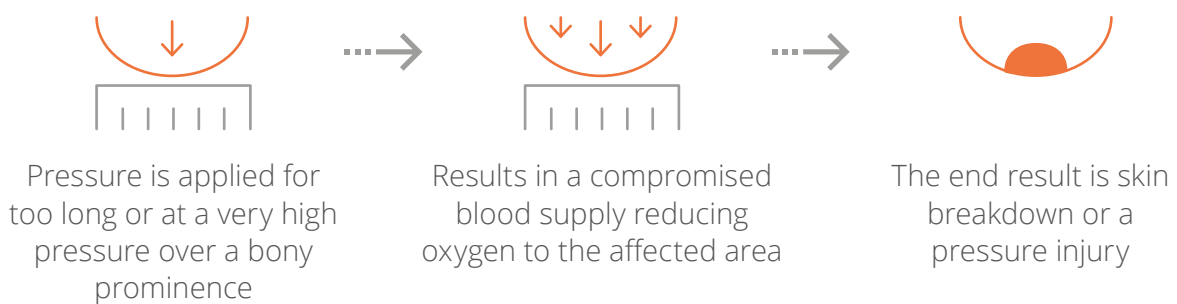
Image courtesy of The National Pressure Ulcer Advisory Panel 2016

Effects of a spinal cord injury on skin integrity

In people with a spinal cord injury, the **nerves** that carry messages back and forth between the skin below the level of your injury, spinal cord and brain don't work the way they should.

The following happens to the skin in people with a spinal cord injury:

- Decreased or absent sensations to register touch, pressure, pain, heat and cold below the level of a spinal cord injury.
- Reduced sweating to help cool body down below the level of the spinal cord injury.
- Excessive sweating may occur above the level of a spinal cord injury.
- Weakness or loss of muscle strength below the level of the spinal cord injury can produce swelling or oedema of the lower limbs due to pooling of the fluids.
- No change to the protective function of your skin below or above the level of a spinal cord injury allowing the skin to protect internal organs against heat, light, injury and infection.
- A pressure injury involves damage to the skin and the tissue underneath the skin due to prolonged or excessive pressure or pressure applied in combination with shear or sliding and friction.



Before your spinal cord injury, your body sent signals for you to move, squirm or change positions when you became uncomfortable. After your spinal cord injury, your early warning system doesn't work as well. You need to actively think about your body and regularly relieve pressure.

Skin problems

In addition to the loss of sensation and impaired regulation of your body temperature, there are many internal and external factors that affect your skin integrity and delay healing of your injured skin.

Internal factors include anaemia, poor nutrition, diabetes, lung disease, emotional and psychological problems, and issues with circulation. Anaemia is a lack of red blood cells carrying oxygen that help promote pressure injury healing.

External factors include drugs, old equipment, deflated or overinflated Roho cushion, alcohol use or smoking. The last two can have a negative effect on your ability to practice good skin care.

Common problems

- Pressure injuries, also called pressure ulcers, bedsores or pressure sores
- Skin rashes and dermatitis

Other problems

- Ingrown toenails
- Hot and cold injuries
- Moist skin
- Sunburn
- More fragile skin over scar tissue
- Cellulitis, an infection of the skin
- Osteomyelitis, an infection of the bone under the skin, fat and muscle layers

Check if you have a problem

Skin Checklist



Consider the following questions when checking your skin:

Have you experienced any recent problems with redness or breakdown of your skin?

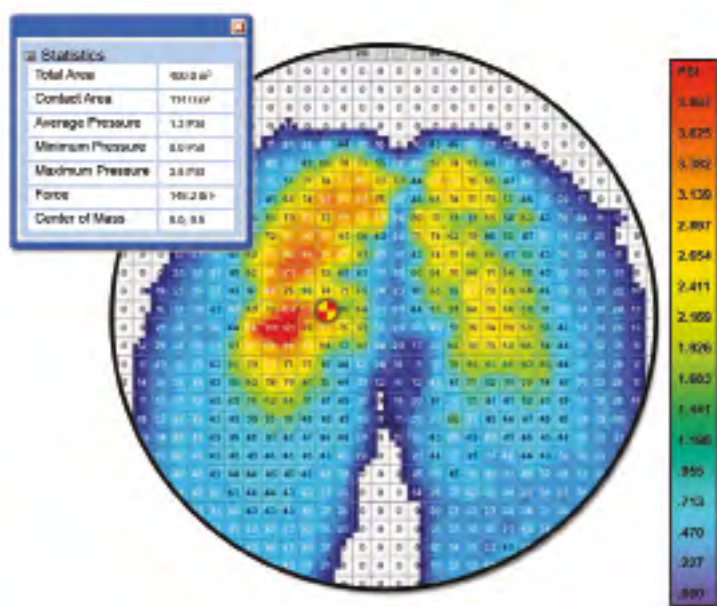
Have you experienced any skin damage from a burn due to heat, cold, overexposure to the sun, chemical or electrical contact?

Have you experienced any recent signs of swelling, redness and warmth to the touch over the skin, which usually occurs in your lower legs?

Do you have deep pressure injury with any signs of infection to the:

- underlying skin and surrounding tissues (e.g., fever, increasing discharge from wound, redness or swelling, unhealthy looking tissue or smelliness)?
- underlying bone and surrounding tissues (e.g., fever, failure of healing or recurrent wound breakdown)?

Have you experienced any recent change in your pattern of spasms, neuropathic pain or autonomic dysreflexia that may indicate underlying skin damage?



What to do next

If you answer "yes" to any of the questions above, please refer to the Severity Scale (page 29) to see whether your problem is mild, moderate or severe, and Interference Scale (page 30) to decide on what management strategy to take.

Warning signs

If you experience any of the following warning signs, you need to seek medical attention:

- Purple or discoloured skin or a blood-filled blister indicating a deep pressure injury that develops from the inside out
- Fevers, sweats, the shakes or you have been feeling unwell because of a pressure injury
- Your pressure injury is discharging a lot of pus and/or the surrounding skin is red
- Your pressure injury has not been improving, has increased in size and depth or has unhealthy tissue at its base.
- Having more than one current pressure injury
- Any major change in your weight (increase or decrease)
- Have you ever required surgery for a severe (stage 3 or 4) pressure injury?

You may need to restrict your activity and use special dressings that help protect the area while it heals. In severe cases, surgery, hospitalisation, medication, and skin grafts may be needed.

Important note

If you experience any of these issues there may be a serious problem requiring further investigation - see medical advice immediately



Prevention

Self-management tips to prevent pressure injuries

Relieve pressure regularly

Action: Reposition yourself and/or lean forwards or from side-to-side in your wheelchair. Try to lean for 2 minutes, at least once every hour.



Check skin twice a day

Action: Use a mirror and/or touch to see or feel your skin, or instruct others to check your skin if you cannot check it yourself.



Use appropriate pressure-relieving devices

Ensure you have a mattress that meets your needs.

Action: If you are using an air mattress, ask your therapist for instructions then teach others how to use the equipment properly.

Use the right cushion and look after it

Learn how to look after and maintain your cushion, and always have a repair kit handy. Seating should be reviewed when replacing cushions, chairs or if problems develop. Avoid over-inflating your cushion, if you have the cushion shown in the picture.



Action: If unsure, see a seating specialist.

Know how to identify skin breakdown

Knowing how to identify skin damage can help you decide on the right course of action and recognise improvement or further breakdown.

Action: Understand the different stages of skin breakdown. Early detection reduces time to healing, improves outcomes and decreases cost.



Maintain good skin hygiene

Action: Keep your skin clean and dry, especially after showering or swimming. Pay attention to the groin, between the buttocks and in between your toes.



Wear loose fitting clothes

Tight-fitting clothes and shoes can damage skin.

Action: Wear clothes that are appropriate for the weather. Wear properly fitting shoes to avoid too much pressure which can cause an ingrown toenail.



Maintain a healthy lifestyle

A healthy lifestyle will assist in keeping your skin healthy.



Do not use too many powders and creams

Powders can turn into tiny hard balls when moist, causing damage to the skin. Creams can make your skin 'soggy', making it more susceptible to breakdown.

Action: Avoid using powders and ensure creams are gently applied and completely absorbed.



Know your medications

Action: Understand the side effects of certain medications, such as sensitivity to sun if taking Baclofen (Lioresal) for spasms.



Image courtesy of The National Pressure Ulcer Advisory Panel 2016

How to prevent heat injuries

When bathing

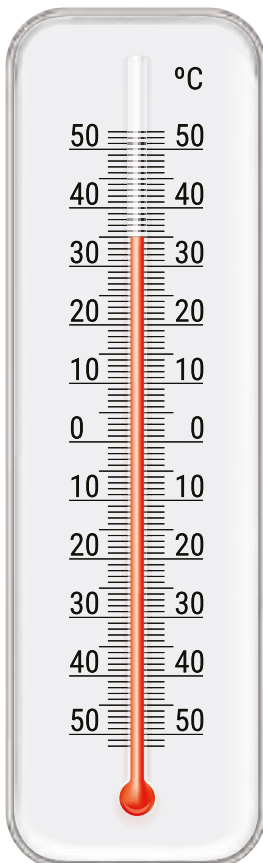
- Check yourself or ask someone to check the water temperature by dipping the hand (with normal sensation) into the water for 5 seconds. If you feel comfortable, then the water temperature is safe.
- Do not set your hot water system higher than 48 degrees Celsius.

Use of heat packs

- Avoid them, especially on body parts with little to no sensation.

Household amenities

- Do not sit too close to heat inside your house such as fireplaces, hot stove burners and radiators. When outdoors, don't sit too close to campfires.
- Do not use electric blankets.
- Do not carry hot fluids or foods in your lap without a tray. Have a cup holder and do not overfill the cup.



How to prevent cold injuries

Outside in cold weather

- Cover your head, nose, ears, chin and hands.
- Wear warm socks and sturdy shoes.
- Remove any wet clothing.

Please note: If you feel cold and tingling on your ears, then most likely your feet are cold too so move indoors.

Ice packs

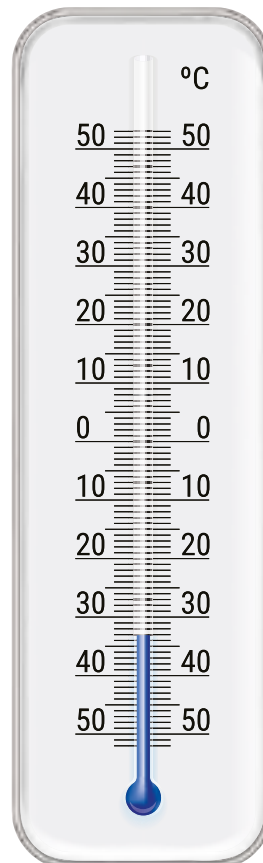
- Always wrap them in a towel.
- Do not use them for more than 10 minutes.

Please note: Be careful with carrying frozen food on your lap in the supermarket.

Using a wheelchair

- Wear gloves to push your manual wheelchair.

Please note: Wheelchair parts and gel cushion can get cold and may cause your skin to dry out, causing cracks, splits and cold injuries that are hard to heal.



Pressure injuries toolbox

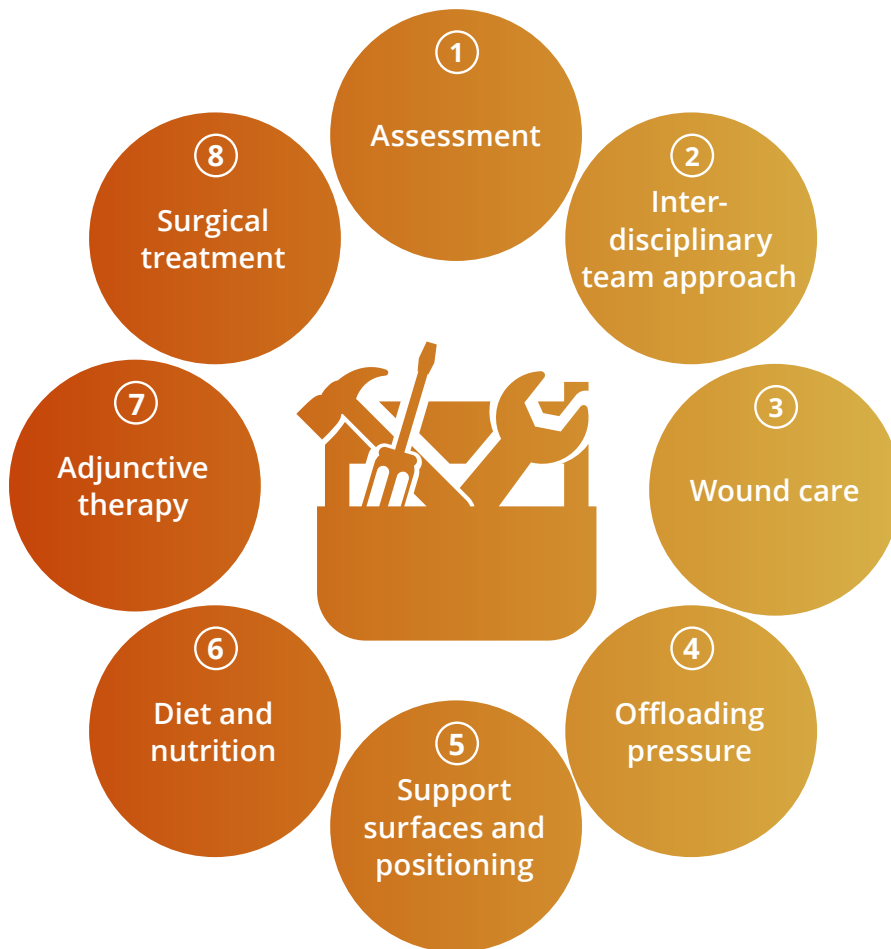
Management of a skin problem can be challenging because many factors play a role. A single strategy, for example, applying a wound dressing, may not be as effective when used in combination with other strategies. Your specialist nurse or doctor may need to try a combination of treatments and this may take some time.

Think about using the pressure injuries toolbox to treat your pressure injury. The toolbox is made up of 8 components as seen in the picture below.

Consider this 8-step toolbox when managing your skin care.

Important note

It is unlikely that changing just one component will fix a pressure injury.



1. Assessment

A proper assessment of a pressure injury considers all the possible factors that can impact healing and risk of recurrence.

These factors include:

- Spinal cord injury-specific factors
- Classification of stages of pressure injury
- Diet and nutrition
- Mechanical factors
- Pre-existing medical conditions
- Psychological and lifestyle factors.

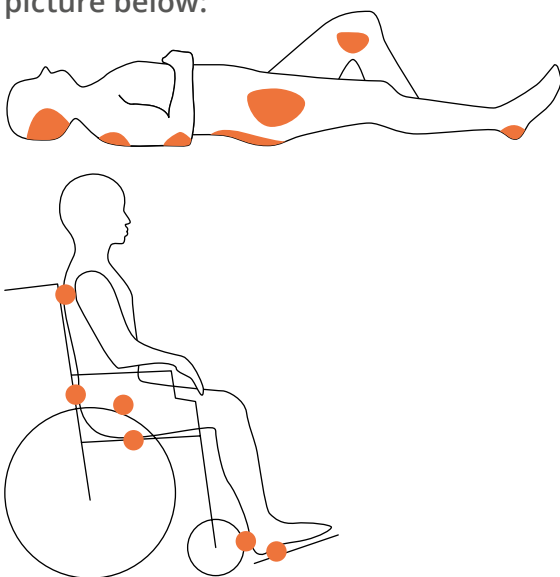
It is recommended to assess and address all of the above factors while monitoring them regularly to maximise pressure injury healing.

Spinal cord injury-specific factors

A variety of characteristics associated with a spinal cord injury affect your risk of getting a pressure injury and the time for healing. Factors include level and extent of injury, ageing, spasms, and bladder and bowel incontinence.

Remember that the greatest pressure is always on the deep tissues and overlying bony prominences.

Locations where pressure injuries commonly develop are shown in the picture below:



Do you know?

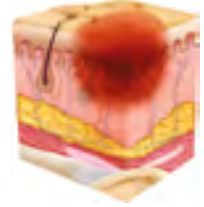
90% of pressure injuries are preventable.

Classification of stages of pressure injury

Pressure injury can be divided into 6 types. Duration of healing is directly related to the relevant pressure injury stage and applying the appropriate treatment. The 6 stages are:

Stage 1

Intact skin with a localised area of non-blanching redness with pressing, usually over a bony prominence. If treated early, stage I pressure injury can heal in about 3 days.



Stage 2

Partial thickness loss of dermis presenting as a shallow open wound with a red-pink wound base. Healing from this stage can last anywhere from 3 days to 3 weeks.



Stage 3

Wound extending through epidermis and dermis into the fatty subcutaneous layer. Healing usually needs at least 1 to 4 months.



Stage 4

Full thickness tissue loss extending into underlying tissues, such as muscle and possibly bone. Healing can take anywhere from 3 months to 2 years.



Deep tissue injury

Purple or maroon localised area, an area of discoloured intact skin, or a blood-filled blister.



Unstageable

Full thickness tissue loss in which the base of the pressure injury is covered by unhealthy skin.



Image courtesy of The National Pressure Ulcer Advisory Panel 2016



Pre-existing medical conditions

If your pressure injury is not healing after 4 weeks (it should be improving by at least 25% per month) or getting worse despite intervention, ask your GP to screen for common conditions, such as anaemia, infection, diabetes and nutritional deficiency, which are known to delay healing. Ensure that you receive appropriate treatment if any of these medical conditions are present.

The presence of infection in the pressure injury can be assessed using the below guide:

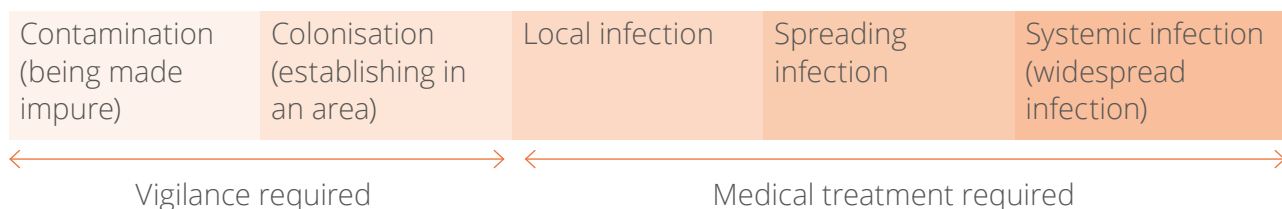
If 3 or more of the following signs are present, this means you have a high amount of bacteria in a superficial wound

- Your pressure injury is not healing
- Increasing ooze (exudate) from your pressure injury
- Red, friable tissue that tears and bleeds more easily
- Appearance of unhealthy tissue with debris or dead cells
- Your pressure injury is smelly.

If 3 or more of the following signs are present, this means you have a high amount of bacteria in a deep wound and surrounding skin

- Your pressure injury has increased in size
- You have a fever
- Exposed bone can be seen at the base of your pressure injury
- You have developed a new pressure injury in the surrounding area
- Redness and swelling (cellulitis) in the surrounding skin
- Increasing ooze (exudate) from your pressure injury
- Your pressure injury is smelly.

Increasing clinical problems



Source: Wound Care Made Incredibly Easy! 2nd ed., Lippincott Williams & Wilkins, 2007.

Ask your GP to perform the following tests to rule out certain health conditions:

Full blood count

Check for level of haemoglobin (cells carrying oxygen to tissues) and the number of white blood cells (that fight infection).

Iron profile

Check for levels of ferritin, serum iron, percentage saturation, and total iron binding capacity which aids healing.

Inflammatory markers

C-reactive protein and ESR which are raised with infection.

Biochemical screen

Check for fasting or random blood glucose, protein and prealbumin levels markers of adequate nutrition.



What does research tell you?

It is recommended to use antimicrobial dressings if signs of infection are present.

Diet and nutrition

Various strategies may be necessary to cater for an individual's nutritional requirements. Seeking advice from a qualified dietitian is recommended.

For more detailed information, refer to the Diet and nutrition section on page 22.

Mechanical factors

Various mechanical factors can influence healing of a pressure injury:

1. Impaired mobility
2. Altered sensory perception
3. Reduced tissue tolerance due to:
 - a. Moisture
 - b. Friction
 - c. Shear.

Strategies:

- Avoid weight bearing on the pressure injury area
- Minimise weight bearing over bony prominences by:
 - Leaning forward or to side for 2 minutes for regular pressure relief
 - Frequently changing position while in bed.

Psychosocial and lifestyle factors

Psychosocial and lifestyle factors also contribute significantly to skin breakdown and impact on wound healing. Consider the following factors:

- Limited social support or living alone
- Inadequate personal care and/or domestic assistance
- Caregiver fatigue
- Financial concerns including access to quality equipment, repairs and provision of services
- Unsustainable work or family commitments
- Signs of mental health concerns, such as depression, depressed mood, social withdrawal or excess use of drugs or alcohol, drug and alcohol use or worsening of a pre-existing mental health condition
- Level of motivation
- Lifestyle priorities, competing interests, roles and responsibilities (trade-off between pressure management requirements and living life)
- Reduced ability to self-manage/direct care, problem solve and troubleshoot
- Smoking.

2. Interdisciplinary team approach

An effective way of treating a pressure injury is to have a comprehensive treatment plan developed with the support of an interdisciplinary team that may include doctors, community nurses, wound nurses, therapists, social workers, psychologists, engineers and dietitians. The plan should address the cause of the pressure injury, other contributing factors, methods for relieving pressure, specific wound care, adjunctive therapies to support healing as necessary, surgery for complex or deep pressure injuries (stage 3 and 4, if indicated), management of complications, and educational and nutritional interventions.

Interdisciplinary team members for pressure injury management



What does research tell you?

Expert opinion recommends a comprehensive assessment by an interdisciplinary team to identify pressure injury risk factors. This assessment includes level and completeness of your spinal cord injury, associated health conditions, level of functioning and mobility, nutritional status, continence, psychological and social factors, care and equipment.

3. Wound care

Good wound care is important and includes:

Cleansing

- Cleanse pressure injuries at each dressing change with a generous volume of sterile solution, e.g., saline water.
- Consider adding an antiseptic agent if there are signs of infections, e.g., Betadine Solution.

Dressings

- The selected dressing should:
 - Provide an optimal level of moisture to the wound base of a stage 2 or 3 pressure injury.
 - Meet your needs based on the location of the pressure injury or injuries and can be modified depending on your goals and/or change in wound status.
- Avoid daily dressing changes if possible, by using a dressing type (absorbent dressing) that manages fluid coming out from the wound bed (also known as exudate) and odour as well as remains in place for as long as possible.

In some instances, wound care may also include wound debridement

- Debridement is the removal of dead (necrotic) or infected skin tissue to help a wound heal.
- Ensure only a qualified doctor or a nurse debrides devitalised (dead) tissue from a pressure injury, using a method appropriate to the wound status.



Should you need to use any of these strategies you are advised to discuss this with your community nurse or general practitioner before applying.

Deciding on what type of wound care dressing is right for your situation

Selecting the right dressing will depend on:

- The size of your wound
- The amount of moisture in the wound
- The level of infection
- The condition of the surrounding skin.

Dressing moisture scale



Pressure injury is too moist

Management strategy

Absorb moisture by:

- Promoting debridement and cleaning the dead tissue from the wound, using an alginate dressing.
- Using an absorptive dressing that contains multiple layers of highly absorbent materials suitable for draining wounds.
- Using a hydrocolloid dressing that is adhesive, mouldable, impermeable to oxygen and water, and promotes debridement.
- Filling a deep wound with wound fillers to promote healing.
- Using foams to provide thermal insulation and create a moist wound environment.



Pressure injury neither too moist nor too dry

Management strategy

Maintain existing moisture level by:

- Using a collagen dressing to promote growth of tissue and blood vessels.
- Using dressings that are made from a woven or perforated material and to be placed directly over the wound then secured by a contact layer dressing.
- Using a transparent film dressing that adheres to the skin and helps maintain a moist wound environment. These types of dressings promote debridement and stimulate formation of granulation tissue.



Pressure injury is too dry

Management strategy

Add moisture by:

- Using a hydrogel dressing to promote hydration to the wound and soften dead tissue.

Other types of dressings

Composite

Combines two or more types of dressings into one depending on the stage of the wound.

Anti-microbial

Contains ingredients such as silver and iodine to protect your wound from bacteria.



What does research tell you?

Expert opinion recommends using a dressing that maintains an optimal level of moisture at the base of the pressure injury.

4. Offloading pressure

Strategies for managing pressure depend on:

- The location of your pressure injury
- Your circumstances and available resources.

Strategies to aid the healing process include:

- Full-time (24-hour) bed rest
- Limited time sitting with close monitoring
- A graduated sitting protocol for a healed pressure injury (see below for more details)
- Equipment monitoring
- A positioning aid such as a heel wedge.

Graduated sitting protocol for pressure injury management

Perform a skin check prior to – and after – sitting at all times.

Day 1	Sit up for 15 minutes twice a day	
	If skin condition does not deteriorate after the 1st day, increase sitting time as described on Day 2.	If a skin condition does deteriorate after the 1st day of sitting, return to bed rest until re-evaluated by medical staff.
Day 2	Sit up for 30 minutes twice a day	
	If a skin condition does not deteriorate after the 2nd day, increase sitting time as described on Day 3.	If a skin condition does deteriorate after the 2nd day of sitting, return to 15 minutes of sitting only.
Day 3	Sit up for 1 hour twice a day	
	If a skin condition does not deteriorate after the 3rd day, increase sitting time as described on Day 4.	If a skin condition does deteriorate after 3rd day of sitting, return to 30 minutes of sitting only.
Day 4	Sit up for 2 hours twice a day	
	If a skin condition does not deteriorate after the 4th day, increase sitting time as described below this section.	If a skin condition does deteriorate after 4th day of sitting, return to 1 hour of sitting only.

Sitting times can progress by doubling the overall length of time from the day before as long as skin checks demonstrate no new pressure-related problems.

Source: Adapted from Houghton PE, Campbell KE and CPG Panel (2013). Canadian Best Practice Guidelines for the Prevention and Management of Pressure Ulcers in People with Spinal Cord Injury. A resource handbook for Clinicians.

Talk with your community nurse or GP before starting a graduated sitting protocol.

5. Support surfaces and positioning

Ensure proper bed positioning by using devices and techniques that are suitable for the type of support surface and your health status.

- Use pillows, cushions and positioning aids to:
 - Bridge contacting tissues, including bony prominences
 - Unload bony prominences
 - Protect pressure injuries and other vulnerable areas of skin.
- Do not use closed cut outs in mattresses or donut type cushions, and avoid being positioned directly on your pressure injury.



Do you know?

Positioning in bed with the head of the bed elevated more than 30 degrees can cause destructive friction and shearing forces, especially over lower back/sacral region. Use the knee break to prevent sliding down the bed.

Important note

Do not place incontinence sheets over the top of your support surface as it negates the redistribution and relief of pressure.

Education is essential so you and your caregivers know how to:

- Carry out repositioning manoeuvres safely, including correct positioning of pillows and wedges, and aids to reduce friction such as slide sheets.
- Avoid pinching of catheter tubing and wrinkling of your clothing under weight-bearing parts of the body.

Talk with your community nurse or GP before using any of the above-mentioned methods.



What does research tell you?

Expert opinion recommends the reassessment of the pressure-relieving performance of sitting support surfaces at least every 2 years, or sooner, if there is:

- A change in your health status, including weight or functioning level
- Wear and tear of equipment
- Development of a pressure injury
- A change in your living circumstances, care and support needs.

Support surfaces are broadly classified in 2 categories: reactive or active types.

REACTIVE or STATIC

A reactive support surface is a powered or non-powered support surface with the capability to change its load distribution in response to the applied load.

Type	Performance characteristic	Application
Foam	<ul style="list-style-type: none"> • Standard support area • Some pressure redistribution • No shear or microclimate management • Routine transfers 	Pressure injury prevention or treatment of uncomplicated pressure injury for high-specification foam or static flotation
High-specification foam	<ul style="list-style-type: none"> • Increased support area • Pressure redistribution • No reduction in shear • No microclimate management • Routine transfers 	Pressure injury prevention or treatment of uncomplicated pressure injury for high-specification foam or static flotation
Static flotation air, gel or water	<ul style="list-style-type: none"> • Increased support area • Pressure redistribution and shear reduction • No microclimate management • May affect transfers • Gel and water heavy to move 	Pressure injury prevention or treatment of uncomplicated pressure injury for high-specification foam or static flotation

ACTIVE or DYNAMIC

An active support surface is a powered support surface with the capability to change its load distribution properties, with or without the applied load.

Type	Performance characteristic	Application
Alternating air pressure	<ul style="list-style-type: none"> • Increased support area • Pressure and shear reduction • No microclimate management • Routine transfers 	Pressure injury prevention or treatment: <ul style="list-style-type: none"> • Pressure injuries on multiple turning surfaces • Failure to heal on static support • Post-operative pressure injuries repair • Greater pressure reduction than static

Source: Modified from Houghton PE, Campbell KE and CPG Panel (2013). Canadian Best Practice Guidelines for the Prevention and Management of Pressure Ulcers in People with Spinal Cord Injury. A resource handbook for Clinicians.

Do you know?

The optimal period for a change in position is still unknown. However, changing position every 2 hours is widely recognised as an effective and clinically useful strategy.

Talk to your community nurse or GP before deciding on a suitable support surface.

6. Diet and nutrition

ONE SIZE DOES NOT FIT ALL

Consult a registered **DIETITIAN** for a comprehensive assessment to develop a personalised nutrition and diet plan, in consultation with your GP.

Your diet plan will tell you:

- How many **CALORIES** to consume each day
- How much **PROTEIN** to include daily
- Which **MINERALS** and **MULTIVITAMINS** you need to promote healing of your pressure injury
- Which **SUPPLEMENTS** to take or avoid.

Important notes

- Inadequate food intake, poor nutritional status, excessive nutrient and fluid losses, and unplanned weight loss impair wound healing.
- Low protein (albumin and prealbumin) values in your blood reflect the severity of illness or injury and the potential for the development or worsening of malnutrition, regardless of nutrition status.
- Inadequate fluid intake may result in dehydration, which plays a role in delayed wound healing.
- Effectively managing your bowel and bladder also impacts the healing of your pressure injury.

Do you smoke?
The most important thing
you can do is quit.



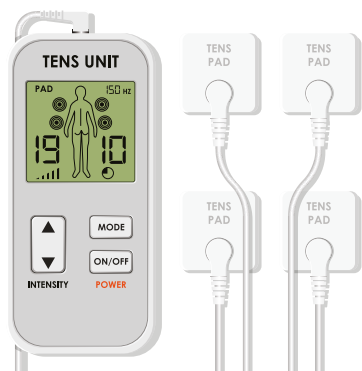
What does research tell you?

Expert opinion recommends having an early assessment by a dietitian to provide optimal nutritional support for all people with a spinal cord injury who have a severe pressure injury, a pressure injury that is not healing at the expected rate, unintentionally lost weight or are at risk of malnutrition.

7. Adjunctive therapy

The two most common methods used to promote healing of a pressure injury are:

Electrical Stimulation



A small battery-like device sends an electrical current via two small rubber pads attached to the skin or surrounding a pressure injury.

This method is used for stage 2, 3 and 4 of pressure injuries.

Negative Pressure Wound Therapy



A suction is attached to a wound dressing that covers the pressure injury, which exerts carefully controlled suction or negative pressure. This action removes wound and tissue fluid from the treated area by draining it into a canister.

This drainage method is used for stage 3 and 4 pressure injuries.

The following interventions are less widely used for promoting healing of a pressure injury, and also have less evidence-based research:

- Maggot Therapy
- Electromagnetic Energy
- Ultraviolet Light
- Electrical Stimulation
- Topical Oxygen
- Laser
- Hyperbaric Oxygen.

Talk to your community nurse or GP before using any of the above-mentioned methods.



What does research tell you?

Electrical stimulation has been shown to increase the proportion of healed pressure injuries when compared with no stimulation. However, the research evidence to date supporting the positive effects of electrical stimulation is insufficient to support its widespread use.

Research evidence supporting the positive effects of negative pressure wound therapy is minimal. In comparison, a standard dressing has better outcomes and lower intervention costs.

8. Surgical treatment

Surgery can play an important part in the management of pressure injuries that are non-responsive to other strategies, e.g., in stage 3 or 4 pressure injuries.

There are a range of surgical interventions:

- Surgical debridement or removing dead tissue
- Direct wound closure
- Skin grafting
- Skin-muscle flap repairs.



Important notes

Consulting a Specialist Spinal Plastics or Skin Care Service for a comprehensive interdisciplinary evaluation is essential before deciding to undergo surgical intervention.

Advantages of surgical intervention:

- Definitive wound debridement with skin and soft tissue coverage
- Improved blood supply
- Improved healing with removal of underlying bony infection called osteomyelitis
- Improved function and independence.

Important notes

Surgery is a huge commitment requiring total bed rest in the prone position for months in hospital prior to and after surgery.

There is also a risk of further skin breakdown after the surgery.

Management of skin conditions

Pressure injuries

A pressure injury (also known as a bedsore, pressure ulcer, pressure sore, or decubitus ulcer) is an injury to your skin and/or underlying tissue usually over a bony prominence. Pressure injury occurs as a result of pressure, shear and/or friction. There are four stages that describe the severity of the pressure injury (for more details refer to the toolkit).

Symptoms of pressure injury:

- Skin swelling
- Pain or tenderness
- Changes in skin color (non-blanchable redness in lighter skin tones and non-blanchable blue/purple skin in darker skin tones)
- Skin that feels cooler or warmer to the touch than other areas
- Skin loss, exposing deeper layers of skin
- Pus-like drainage from an open area of skin for severe grade.

Treatments for pressure ulcers (sores) include regularly changing your position, using special mattresses to reduce or relieve pressure, and dressings to help heal the ulcer. Surgery may sometimes be needed. For details prevention and management strategies, please refer to the toolkit.

Skin rashes and dermatitis

A skin rash describes an area of irritated or swollen skin, which may be dry, itchy, red, painful, rough, smooth, cracked, moist or blistered in appearance. A rash can affect only a small part of the body or cover a large area. Possible causes of rashes include dermatitis, infections, allergic reactions to taking a medication and certain diseases.

Dermatitis is a general term that describes a common skin irritation, with 3 common types: atopic dermatitis (eczema), seborrheic dermatitis (e.g., scalp dandruff) and contact dermatitis from exposure to an irritant. Applying a moisturising cream regularly helps control the symptoms of dermatitis. Treatment may also include medicated ointments, creams and shampoos.

See your doctor if your skin becomes painful, if you are experiencing discomfort that distracts you during everyday life or interferes with your sleep, if you think that your skin is infected, and/or you have tried self-care steps, but the signs/symptoms persist.



Ingrown toenails

- If the area around the nail is red and you see pus when you press on the edge of the nail, your nail may be cutting into the skin.
- Soak your foot in soapy water, wash it well, rinse and gently dry.
- Place a small piece of cotton under the nail to keep the edge of the nail away from the skin. Change the cotton daily.
- If it does not begin to heal in 2 or 3 days, see your doctor or healthcare provider.
- Make sure your socks and shoes leave plenty of room for your toes.
- Keep your feet clean and dry.
- Keep your toenails trimmed.



Heat injuries

Loss of skin sensation puts you at risk for a burn injury.

How to treat heat injuries

Apply cool water and administer first aid immediately. Do not use ice or an ice pack on a burn. Seek medical attention as soon as possible.

Cold injuries

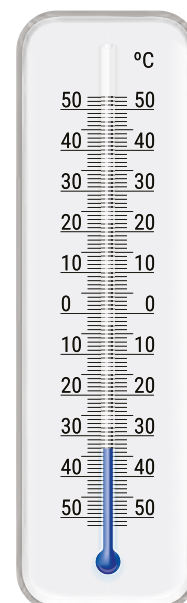
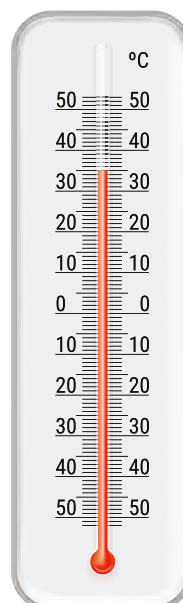
Loss of skin sensation increases your chances of getting a cold injury, also known as frostbite.

How to treat cold injuries

Since skin may be numb, people with frostbite can harm themselves further unintentionally. Seek medical attention as soon as possible.

Do you know?

Chilblains are patches of discoloured (red, blue, white) skin, along with swelling and blistering on your hands and feet. Chilblains are thought to be caused by a combination of cold weather and poor circulation. The toes are particularly vulnerable and tight shoes can contribute by further reducing circulation to the toes. Most chilblains don't cause any permanent damage to tissue, although sometimes they can cause skin ulceration.



Moist skin

Sweating, urine incontinence or diarrhoea make your skin wet increasing your chances of a skin infection.

Healthy tips

- Keep your skin clean and dry.
- Pay special attention to cleanliness in sweating areas.
- Clean and dry well under skinfolds.

Sunburn

Sunburn is a form of radiation burn affecting living tissue, e.g., skin, as a result of overexposure to ultraviolet or UV radiation, usually from the sun.

Healthy tips

- Check weather conditions on your weather app or check online and make sure you apply sunscreen with a recommended sun protection factor.
- Wear a hat and a long-sleeved shirt when you are out in the sun.
- Certain medications, such as antibiotics and local skin ointments, can make your skin more sensitive to sunburn. Check with your pharmacist.



More fragile skin over scar tissue

Scarred skin can be thinner and susceptible to re-injury than healthy skin. An old scar may also be more prone to breakdown if overlying bone. With ageing, the skin may become more fragile and prone to tearing due to skin atrophy.

Signs and symptoms of fragile skin

- Skin that appears thin, dry, or transparent.
- Skin that tears or bleeds easily
- Thinning (atrophy) of the top layers of the skin.
- Frequent skin bruising.

How to treat scarred skin

- Stay hydrated: good skin needs proper moisture and hydration, and one of the best ways you can achieve this is by staying hydrated and drink a total of 6-8 glasses per day. The more water you consume, the better you can flush out all the toxins and pollutants in your body. Staying hydrated also removes any dry patches on your skin too.
- Improve your diet: your diet nourishes your body and can make a huge difference on your skin as well.

Cellulitis, an infection of the skin

Cellulitis is a serious infection of the skin, where bacteria enter the skin through a crack or break. The infection can further spread to other part of the body and may sometimes lead to blood poisoning (sepsis). This needs urgent treatment with antibiotics.

Signs and symptoms of cellulitis

- The skin appears swollen, red and warm to the touch.
- Cellulitis usually affects the lower legs, but it can occur on the face, arms and other areas of the body.

How to treat cellulitis

- Finish full course of your antibiotics (typically 7-10 days) even if you start to feel better.
- An important strategy for prevention is to
 - maintain good skin hygiene,
 - ensure feet and between toes are dried, and
 - avoid cracking of the skin.

Osteomyelitis, an infection of the bone under the skin, fat and muscle layer

Osteomyelitis is inflammation or swelling that occurs in the bone. It can result from an infection that can reach bones through the bloodstream or spreading from nearby tissue. Testing for osteomyelitis may involve a bone biopsy, as well as x-rays, CT or MRI scans.

Signs and symptoms of Osteomyelitis

Pain, fever, failure of healing or recurrent wound breakdown.

How to treat osteomyelitis

Treatment is usually surgery, to remove the sections of bone that are infected or dead. This is followed by intravenous antibiotics in hospital and a prolonged course of oral antibiotics for 3-6 months.

Management index

The severity of your skin problems can vary depending on the underlying cause.

To decide on the most appropriate management strategy, it is important to assess how severe your problem is and how much it interferes with your participation in everyday activities.

To work out the best management strategy, use the severity and interference scales below.

Severity scale

To check the severity of your problem, consider the intensity, duration and frequency of signs and symptoms using this table.

Problem	Mild	Moderate	Severe
Pressure injury	Stage 1 or 2 pressure injury, which heals rapidly	Stage 2 pressure injury (≥ 4 weeks), AND/OR infection (superficial) present Recurrent or multiple Stage 1 or 2 pressure injuries	Stage 3-4 pressure injury, deep tissue injury, prolonged healing (≥ 3 months) AND/OR infection (deep) present Recurrent pressure injuries/previous flap repair (Stage 3-4) Deteriorating or pressure injuries over multiple areas
Burn	Superficial burn (first-degree). Skin is red, painful, dry, without blisters. Mild sunburn	Partial thickness (second-degree) burn. Skin is red, blistered, and may be swollen and painful.	Full thickness (third-degree) burn. Skin looks white or blackened and charred.
Cellulitis	–	Red, swollen, tender, warm area of skin Occurs infrequently (once every 12 months or less often)	Red, swollen, tender, warm area of skin Occurs frequently (twice or more per year) AND/OR spreads to involve lymph nodes and/or enters bloodstream

Important note

Any skin-related symptoms of any severity associated with autonomic dysreflexia are considered **SEVERE** and require **URGENT MEDICAL ATTENTION**.

What will happen if you do not manage your skin problem 'just-in-time'?

Serious complications can arise if pressure injuries are not managed in a timely way. In the long term, these issues can lead to:

- **Worsening of the pressure injury:**
The pressure injury may get larger and deeper, and result in tunneling which is a formation of track between layers of muscle, fat or bone that may be hard to heal.
- **Infection:**
In a deep pressure injury, the bone can become infected, known as osteomyelitis. The infection can spread into your bloodstream making you extremely sick, in some cases leading to death.
- **Scarring:**
Most superficial injuries heal by forming scar tissue. Scar tissue has poor blood supply, is less elastic and more susceptible to breakdown than normal skin, making reoccurrence of a pressure injury more likely. If you have scar tissue on a weight-bearing area, limit your time in that position to prevent recurrent breakdown.

'Just-in-time, or the right care at the right place at the right time, will reduce risk and prevent complications. As a result, you will maintain your quality of life, independence, health and wellbeing.

Be proactive and take responsibility for managing your own health risks

This involves:

- Education to know how your spinal cord injury affects your skin and what the research tells us.
- Becoming a partner in decision-making with your doctor and health professionals.
- Developing an individual health management plan.
- Engaging in ongoing health and wellness activities for healthy skin by:
 - Relieving pressure regularly
 - Knowing how to identify a pressure problem
 - Maintaining a healthy diet and drinking plenty of water
 - Scheduling an annual check-up to rule out other causes of skin breakdown.



Prevention is better than cure

Take home messages



EAT

a balanced diet



MAINTAIN

good hygiene with special attention to your groin and washing/drying between your toes



RELIEVE PRESSURE

regularly

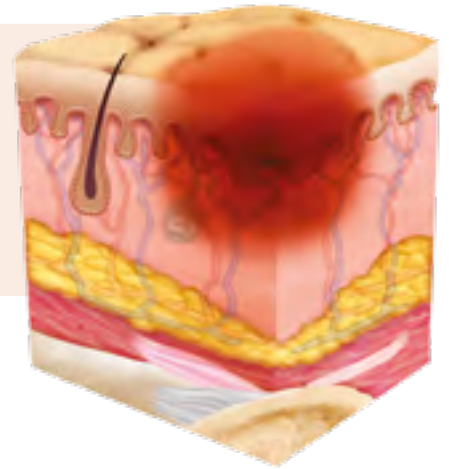
KNOW

how to identify signs of a pressure injury and skin breakdown



TREAT

your pressure injury at an early stage



Knowledge test

1. When assessing your pressure injury risk, you need to consider:
 - (a) Internal factors, such as immobility, lack of sensation and underlying medical conditions.
 - (b) External factors, such as pressure, friction, moisture and force.
 - (c) Mechanical factors.
 - (d) All of the above.
2. List four treatment strategies from the pressure injuries toolbox:
 - i. _____
 - ii. _____
 - iii. _____
 - iv. _____
3. Effective bowel and bladder management lowers your risk of pressure injury and promote healing.
 - (a) True
 - (b) False
4. Select the skin problems that does not occur due to your spinal cord injury. Check the correct answers.
 - (a) Burns.
 - (b) Acne.
 - (c) Frostbite.
 - (d) Ingrown toenail.
5. When you have a pressure injury, what factors need to be considered by your healthcare professional to select the right wound dressing?
 - (a) The size of your wound.
 - (b) The amount of moisture in the wound.
 - (c) Possible infection of the wound.
 - (d) The condition of the surrounding skin.
 - (e) All of the above.

For correct answers, please see page 35.

Glossary

Term	Definition
Cellulitis	A common, potentially serious bacterial skin infection. The affected skin appears swollen and red and is typically painful and warm to touch. Cellulitis usually affects the skin on the lower legs, but it can occur in the face, arms and other areas.
Debridement	The removal of damaged tissue or foreign objects from a wound.
Dermatitis	A common skin condition caused by inflammation of the skin. There are several different forms of dermatitis, but all are caused by the skin reacting to allergens or irritants. Dermatitis is usually characterized by red, itchy skin that can become blistered and weepy.
Osteomyelitis	An infection of the bone, a rare but serious condition. Bones can become infected in a number of ways, especially when the bone is exposed to an external environment due to your deep pressure injury.
Skin grafting	A surgical procedure that involves removing skin from one area of the body and moving or transplanting it to a different area.
Sinus	A tract leading from a skin to a deep tissue, resulting from acute or chronic pus.
Venous ulcers	Wounds that are thought to occur due to improper functioning of venous valves, usually in the legs. Often called leg ulcers.

Further resources

Reading resources for consumers

- Pressure Ulcers: What You Should Know - A Guide for People with Spinal Cord Injury (48 pages)
Access at: https://pva-cdnendpoint.azureedge.net/prod/libraries/media/pva/library/publications/consumer-guide_pressure-ulcers.pdf

Useful resources for consumers and medical professionals

- Pressure Ulcer Prevention and Treatment Following Spinal Cord Injury: A Clinical Practice Guideline for Healthcare Professionals (104 pages)
Access at: https://pva-cdnendpoint.azureedge.net/prod/libraries/media/pva/library/publications/cpg_pressure-ulcer.pdf

Videos for consumers

- Pressure sores (3 minutes)
Access at: https://youtu.be/C_UyC8l8-Vw
- Understanding Pressure Injury Staging (4 minutes)
Access at: <https://youtu.be/xNH8DDvjSME>
- Pressure Ulcer Prevention: A guide for patients and carers (18 minutes)
Access at: https://youtu.be/aMp7Dx7z3_w



Answers to knowledge test

1: d; 2: i. Assessment, ii. Wound care, iii. Offloading pressure, iv. Diet and nutrition;
3: a; 4: a, c and d; 5: e;

Ageing with your spinal cord injury

Ageing is a process that affects us all and involves changes to our body systems with functional decline, along with shifts in social roles, financial situation and supports.

However, in a person with spinal cord injury, ageing becomes more complicated as the changes that occur as part of the normal ageing process are overlaid on top of the effects of having a spinal cord injury. As a result, you may experience the effects of ageing faster in some body systems and new health problems developing at a younger age.

Due to the spinal cord injury, there is an immediate reduction in functional reserves and capacities of certain body systems. With loss of capacity in some systems, other systems have to compensate, often performing near maximum capacity. In combination, this change may lead to overloading of some body systems and functions with premature (earlier) or accelerated ageing.



What does research tell you?

- Premature ageing is more likely to occur in your muscles, joints, bones, heart and glands.
- There is evidence that urinary (bladder and kidneys), gastro-intestinal (bowel and digestive system), skin and respiratory (lungs) systems may be prematurely ageing.
- People with SCI are more likely than the general population to experience urinary tract infections, kidney and bladder stones, chronic pain, pressure injuries, and bone loss with fractures.



Issues with ageing with spinal cord injury

Body System	Issues with ageing with SCI
Bladder and kidneys	Age-related changes are intensified by the type of bladder problem, how you manage your bladder and length of time after injury. Potential backflow of urine with kidney damage can result from an overactive bladder and poor emptying.
Bowel and digestive system	The function of your digestive system naturally declines with age and spinal cord injury makes slowing of the gut worse.
Endocrine (glands)	The secretion of hormones is vital for metabolism, growth, sleep and tissue healing and repair. People with a spinal cord injury have lower levels of certain hormones that decrease with age, including growth hormone and testosterone leading to changes in body composition, obesity and metabolic disorders, with impaired glucose tolerance and higher rates of diabetes.
Heart	Heart disease may occur as the metabolism slows down, with weight gain over time (may eventually become obesity), reduced exercise tolerance, changes in lipid profile (increase in "bad" cholesterol or LDL with decrease in "good" cholesterol or HDL), and diabetes.
Lungs	Worsening lung function due to respiratory or abdominal muscle weakness, spinal curvature or spasms with increased risk respiratory tract infections and clots. Risk of obstructive sleep apnoea increases with age, more so in people with tetraplegia.
Mental health	People usually live fulfilling and pleasurable lives without experiencing major emotional problems as they age. In fact, most older adults, with and without a spinal injury, are resilient and adjust well to changes in their physical abilities. They also note improved relationships with loved ones, increased appreciation for life, and changes in priorities.
Muscles, joints and bones	Overuse ('wear and tear') of muscles, tendons and joints occurs particularly in the upper limbs (shoulders, arms, and hands) due to the demands of everyday living, leading to injuries (e.g., shoulder rotator cuff tears), inflammation (e.g., tendonitis), arthritis and pain. These changes impact on level of functioning and independence in performing daily activities (such as transfers and wheelchair mobility).
Skin	People with spinal cord injury are already susceptible to pressure injuries due to altered sensation and mobility. In addition, with progressive tissue thinning due to ageing, becomes even more prone to breakdown and harder to heal once a pressure injury has developed.
Spinal cord and nerves	Late onset weakness or sensory loss, increasing muscle weakness, pain or spasticity can occur with ageing due to normal nerve drop out or problems from: <ul style="list-style-type: none"> • over- or misuse of muscles and bones leading to nerve damage. • changes within the spinal cord itself (such as a cyst).

Recommendations for ageing with spinal cord injury

These may vary by age, gender, ethnic background, family history, and other factors.

Frequency	Checks
Daily	<ul style="list-style-type: none"> • Self-skin check • Stay active • Eat and drink responsibly
Monthly	<ul style="list-style-type: none"> • Women: Breast self-exam • Men: Testicular self-exam
Yearly	<ul style="list-style-type: none"> • Vital signs / measures including pulse, blood pressure (in sitting and supine lying positions), vital capacity, weight/waist circumference • Blood tests including full blood count, biochemistry (electrolytes, Liver function, renal function, blood sugar level), HbA1c, Cholesterol, Vitamin D level. • Women (40 years and older): mammography • Men (50-69 years): may have digital rectal exam and prostate specific antigen (PSA) test • Flu vaccination, especially for people with injuries at T8 and higher • Renal/Bladder ultrasound
1- to 2-yearly	<ul style="list-style-type: none"> • Comprehensive Health Evaluation reviewing all body systems • Faecal occult blood test (50-74 years) • 55 years and older: comprehensive eye exam • Cystoscopy (in those with long-term indwelling urethral or suprapubic catheters > 10 years)
3- to 5-yearly	<ul style="list-style-type: none"> • Women: breast cancer exam by a doctor • Women: gynaecological exam and Pap smear • Assess adaptive equipment and posture • Assess range of motion, contractures, and function • Bladder exam; also do this each year for the first 3 years after any major change in urologic management (including Videourodynamics) • Bone Health - DEXA scan, performed in first year post-injury (baseline reading) then repeat every 3-5 years)
5-yearly	<ul style="list-style-type: none"> • Motor and sensory testing • Multidisciplinary clinic review (of function, participation, ADL, community mobility and lifestyle demands, equipment and care assistance requirements) • Pulmonary (Lung) function test
10-yearly	<ul style="list-style-type: none"> • Tetanus booster • Colonoscopy, which allows your doctor to examine your colon, beginning at 50 years of age (unless at high risk)
When required	<ul style="list-style-type: none"> • Recognise and treat adverse health conditions early

The Spinal Cord Injury Health Maintenance Tool

The Spinal Cord Injury Health Maintenance Tool (SCI-HMT) is a guide to help you understand and troubleshoot problems you experience in managing your life after a spinal cord injury. It is important for you to learn how to self-manage your health-related needs. This tool has been developed by people with spinal cord injury, general practitioners and expert clinicians. The SCI-HMT provides evidence-based information, tips and tools to help you proactively manage your own health in six key areas – mental health, bladder, bowel, skin, pain and autonomic dysreflexia.

To improve accessibility and cater for a range of learning styles and user preferences, the SCI-HMT has been developed as three free and complementary products:

Booklets

You can ask for printed versions of the booklet from your spinal service provider.

OR

Access and download the PDF versions at: www.healthmaintenance.com



Website

The website has interactive elements that you can use anonymously.

Go to: www.healthmaintenance.com



Smartphone App

The app keeps all your personal information secure within your phone and is not shared with anyone else. You can get it from the Apple Store or Google Play Store by scanning these QR codes on your smartphone.

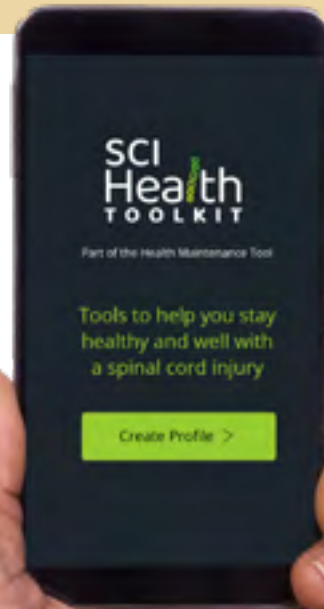
Or search "SCI Health Toolkit"



Apple



Google



The digital versions (website and app) have many interactive features and resources to help you understand your health maintenance needs.

The website includes below elements:

- Search tab
- Quick links
- Videos
- Downloadable interactive diaries
- Customisable care plan
- Quick Health Check
- Quizzes
- Glossary
- Further reading

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