

Introduction

Every year, around 180,000 new patients suffer from a pressure ulcer or tissue injury. The patients present with diverse backgrounds, elderly, young and those in-between. Obesity is a growing concern globally, and often complicated with the added burden of diabetes (referred to as diabetes).

Groups at particular risk of having a pressure ulcer have been reported in depth in the RCN guidelines (2001) and are summarised here. In brief an individual's potential to develop pressure ulcers will be influenced by the following intrinsic risk factors:

- Reduced mobility or immobility
- Acute illness
- Level of consciousness
- Extremes of age
- Previous history of pressure damage
- Vascular disease
- Severe, chronic or terminal illness
- Malnutrition

In addition to these factors, extrinsic factors include the following:

- Skin temperature
- Moisture
- Shear
- Posture
- Pressure
- Time in sitting

At particular risk are the group of patients with a spinal injury or acquired brain injury. More specific risk factors related to SCI patients include:

- Paralysis and sensory impairment (if you are unable to feel things normally, you won't know if something is irritating your skin).
- Changes in collagen metabolism (the way your skin and connective tissues are able to build new tissue and heal) caused by SCI. Wound healing may take five times longer below the level of SCI due to these changes
- Muscle atrophy (shrinking) can leave the bony prominences on your backside (or other areas) less padded, so that there is less protection over these areas.
- Altered circulation can reduce the blood supply to tissues, which not only increases your risk for skin problems, but slows the healing process if you do develop a pressure sore.

Data shows that about one-third of patients with SCI develop pressure injury during their initial hospitalisation.

The Causes of Pressure Injuries

1. Pressure

This is the most common cause, and it's important to be aware of how different amounts and duration of pressure can cause damage to skin. All of these conditions can be damaging:

Long periods of low pressure — it is estimated that between one and six hours of constant low pressure can cause some tissue damage.

Recurrent pressure, such as frequently bumping your elbow against a table, desk, or arm rest many times each day.

Short periods of high pressure, such as accidentally whacking yourself hard against a surface when doing a transfer.

Body tissues vary in their tolerance or their sensitivity to pressure. Skin is actually the most pressure-resistant compared to other body tissues. Muscle, because it is so metabolically active, can start to have problems more quickly than other tissues. That is why it's possible for muscle underlying the skin to be damaged while the skin above it is still intact.

2. Shear

Dragging skin or body parts across a surface, as when transferring without lifting your backside off the surface, can damage your skin.

3. Positioning

Abnormal or less than ideal positioning in your wheelchair, vehicle, or other equipment can increase pressure over specific bony areas.

4. Skin moisture and maceration

Skin that is exposed to moisture for extended periods can become macerated (softened and weakened) and vulnerable to breakdown. Exposure to urine and faeces due to incontinence is of most concern, but sweat can also be a problem.

WHY ARE WE SO CONCERNED ABOUT PRESSURE INJURIES?

1. **A common cause of hospitalisation:** Once they go home after rehab, most SCI patients would rather they never had to visit hospital again. However 39% of patients who are re-hospitalised in the first year after SCI are admitted for pressure ulcers.
2. **Increased care needs:** Having pressure ulcers likely means you require extra help with your personal care. This means patients can go from mostly or completely independent to needing a lot of help and losing that independence.
3. **Expense:** about 25% of the total lifetime cost of medical care for a person with SCI is related to pressure sores. SCI is an expensive situation and that cost needs to be reduced where possible.
4. **Personal cost:** Pressure sores have a dramatic impact on the life of a person with SCI and have multiple negative consequences. Loss of income, increased care costs, loss of usual activities and sources of life satisfaction are just some of the personal costs.
5. **Death:** About 7-8% of deaths in the SCI population are related to a pressure sore, and most likely result from sepsis, an infection that spreads through the body in the blood and tissues.

Background and Problem Statement

Effective bowel management is essential for the future well-being of the individual. When we consider the use of shower commode chairs in the case of SCI patients, several challenges are clear.

1. By the very nature of the design of the seat of a shower commode chair (it requires an aperture of reasonable size), there is a reduction in the surface area available to spread the patient load. Thus the interface pressure is increased in the area where the patient contacts the seat.
2. The seat aperture needs to be of a size which allows adequate access for cleaning and application of medication (use of suppositories or enemas is common) or use of an irrigation system
3. As a result of the injury, peristalsis is often less effective and constipation is highly likely. This results in the user needing to remain sitting on the hygiene chair for longer periods, often around 1.5-2 hours at a time.
4. Loss or partial loss of muscle strength and sensory input in the trunk and/or the limbs leads to reduced control of sitting balance, making personal hygiene routines complicated and difficult to manage. Traditional seat apertures may exacerbate this by restricting access to the body.
5. Loss of sensation makes it almost impossible for a user to determine if they are sitting on a surface which is free of wrinkles or edges, whilst aiding their postural balance.
6. That in as little as 2 hours, sufficient cellular deformation can take place to create the environment for pressure injury development.

It becomes clear very quickly that we need to pay more attention to the protection of the skin whilst the patient is using a shower commode chair. By helping to give focus and providing solutions in this area, we anticipate that patients will feel more confident that using their shower commode chair will be comfortable, encourage activity, support their posture and protect their skin.

Whilst there is significant choice to OT's when it comes to shower commode chairs, feedback from clinicians, OTs and patients suggests that many products fall short when the specific requirements of a SCI patient are considered.

Wealden Rehab were encouraged by the Senior OT at a spinal injury outpatient unit to sponsor the study of interface pressures recorded across a range of the available products. To this end we set up two separate trials, the results of which are represented here.

Both trials were conducted using a FSA and Boditrak digital pressure mapping unit with a standard BT1510 455mm x 455mm seat mat with 256 sensors, calibrated to a maximum of 300mmHg and connected to a laptop which allows recording of the process and results.

TABLE OF PRESSURES

Product/Seat Item	Notes	Seat Angle, degrees	Max pressure (mmHg)	Average Pressure (mmHg)
CASE STUDY 1				
Prism, T70, Medium Horseshoe module		0	300+	54.82
Prism, T70, Large Horseshoe module		0	300+	59.28
RAZ AT, Moulded seat		0	204.53	36.93
RAZ AT, Visco foam seat		0	173.71	33.74
CASE STUDY 2				
Varilite Seat Cushion		4	160.28	45.22
Varilite Seat Cushion	User, leaning forwards for weight shift	4	118.66	42.84
Varilite Seat Cushion	User, leaning to left for weight shift	4	93.50	30.87
Prism T80, medium horseshoe module	Initial seated position	0	300+	54.18
Prism T80, medium horseshoe module	Adjusted seated position	0	300+	54.82
Prism T80, medium horseshoe module	User, leaning forwards for weight shift	0	116.62	24.05
Prism T80, medium horseshoe module		17	300+	44.31
Prism T80, medium horseshoe module		25	300+	34.81
Aquatec Ocean VIP, soft top seat accessory		0	300+	46.25
Aquatec Ocean VIP, soft top seat accessory		20	300+	45.40
Aquatec Ocean VIP, soft top seat accessory		40	300+	40.85
Aquatec Ocean VIP, soft top seat accessory	User, leaning forwards for weight shift	0	244.34	39.60
RAZ AT , Visco foam seat	User, sitting with arms folded across hips	0	154.43	46.54
RAZ AT , Visco foam seat	User, sitting with arms resting on armrests	0	120.89	35.81
RAZ AT , Visco foam seat		15	121.50	33.75
RAZ AT , Visco foam seat		25	109.68	30.68
RAZ AT , Visco foam seat		41	133.86	28.21

LIMITATIONS OF THIS STUDY

Whilst we approached this with the best intentions, to get even more accurate results we would like to carry out the study in more controlled circumstances. With a specialist in control of the environment and measurement, we believe that the results could be presented as clinically accurate. However given that this is not a precise science, the extra accuracy may not give us extra depth of insight.

There are limitations to interface pressure mapping – IPM predominantly measures pressure not shear, needs training to get the best results, and does not take into consideration any intrinsic risks. In this respect, it is just a snapshot and a screenshot is not representative of the entire process.

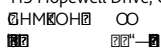
RAZ SP

The stainless steel, height adjustable modular shower chair

- Stainless steel frame & hardware
- Modular
- Adjustable frame height
- Excellent seat design



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