

Preventing pressure damage when seated

KEY WORDS

- ▶ Pressure ulcers
- ▶ Seating
- ▶ Prevention

Pressure ulcers are common, costly and adversely impact on individuals' health-related quality of life. Among those who spend a prolonged period of time in a seated position, pressure ulcers are a particular problem because the body weight is loaded onto a relatively small surface area. Once a pressure ulcer develops, the individual may be required to make substantial modifications to their lifestyle to allow for healing of the wound. This, in turn, can exacerbate the adverse effect of the wound on their quality of life because the ability to undertake usual activities of daily living may be negatively impacted upon. Therefore, accurate assessment of pressure ulcer risk among seated individuals is important, and the first step in prevention. Following this, planning prevention should give consideration to the lifestyle of the individual, the duration of seating, the type of seat in use including the type pressure ulcer redistribution device employed. This article will provide advice and guidance in preventing pressure ulcer damage in the seated individual.

The 2014 international pressure ulcer prevention and management guidelines define a pressure ulcer as 'localized injury to the skin and/or underlying tissue usually over a bony prominence, as a result of pressure, or pressure in combination with shear' (National Pressure Ulcer Advisory Panel [NPUAP] et al, 2014). Pressure is the amount of force acting on a unit of area (Bennett and Kavner, 1979), whereas, shear forces occur in soft tissue when these tissues are stretched, as happens when the bony structures move but the skin does not move correspondingly (Bennett and Kavner, 1979).

The World Health Organisation (WHO) (2010) suggests that the wheelchair is one of the most commonly used assistive devices for enhancing personal mobility. It is estimated that 10% of the global population, almost 650 million people, have disabilities and of these individuals 10% require the use of a wheelchair (WHO, 2010). Pressure ulcers are common, particularly among those confined to a chair (Stockton and Parker, 2002). Indeed, international pressure ulcer prevalence figures among those with prolonged seating individuals varies from 17% to 58% (Stockton and Parker, 2002; Charlifue et al, 2004; Sheerin et al, 2005; Nangole

et al, 2009; Kovindha et al, 2015). Among elderly patients with prolonged seating episodes cared for within the nursing home setting, an incidence of 17.6% has been identified, specifically termed as sitting pressure ulcers, occurring over the ischial tuberosities or the sacral/coccyx region (category I or greater) (Brienza et al, 2010).

Pressure ulcers are costly and adversely affect health-related quality of life for the individual (Moore and Cowman, 2014). Indeed, individuals with spinal cord injury in addition to pressure ulcers display significantly lower health-related quality of life compared to their counterparts without a pressure ulcer (Lourenco et al, 2014). In addition, the greater the number of pressure ulcers an individual has, the worse the health-related quality of life (Lala et al, 2014). Almost 4% of the annual healthcare budget is spent on pressure ulcers, with nursing time accounting for 41% of these costs (Posnett et al, 2009). Furthermore, pressure ulcers increase length of hospital stay, readmission and mortality rates (Lyder et al, 2012), and add considerably to the cost of an episode of hospital care (Chan et al, 2013). This paper will address the key considerations in planning pressure ulcer prevention among seated individuals.

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WHY ARE THOSE WHO SPEND A LONG TIME SEATED AT RISK?

In the seated individual, body weight is loaded onto a relatively small surface area, namely the ischial tuberosities (the sitting bones) and buttocks, the coccyx and upper thighs (Stockton, 2002) (Figure 1). Sitting forces the weight of an individual against the supporting seat surface, compressing the soft tissues and increasing risk of pressure ulceration; therefore, regular repositioning for those confined to the chair, as often as every 15 to 30 minutes, is recommended (Schofield, 2013).

When pressure is not evenly distributed, it is the point pressure (i.e. the pressure applied on a specific area of the body), which causes damage (Husain, 1953). When seated, the contact area is much smaller than when resting in bed, thus the risk of pressure ulcer development is increased. This relates to physics, where pressure is the amount of force acting on a unit of area (O'Callaghan et al, 2007). The pressure sustained is equal to the amount of force divided by the area. The same amount of force applied to a small area, when compared to that of a bigger area, will result in greater pressure (O'Callaghan et al, 2007). For an individual in a seated position, the force pressing on the surface is the weight of the individual. An addition to this is the shape of the pelvis when seated: the ischial tuberosities are approximately 6–8cm below the next bony structure, the trochanters, increasing the effect of the pressure (Bader and Hawken, 1990). This difference in height puts a huge demand on the seating surface. The ischial tuberosities, buttocks, coccyx and thighs support the weight of the body, such that if an individual is left in a seated position for a protracted period of time, it is in these areas that pressure ulcers will primarily develop (Stockton et al, 2009).

HOW TO IDENTIFY RISK IN THE SEATED PERSON?

Risk assessment is a fundamental aspect of pressure ulcer prevention as it is a precursor to planning interventions that are focused on the individual needs of the patient. Undertaking risk assessment has traditionally focused on the use of formalised risk assessment tools; however, most of these tools have not been validated for use in the seated indi-

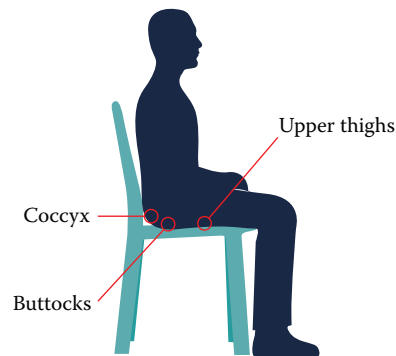


Figure 1. Areas of high pressure for the seated individual

vidual. Indeed, in their study of 150 wheelchair users, Anthony et al (1998) found that risk factors for pressure ulcer development were gender (males more likely to develop a pressure ulcer), and whether they use a wheelchair all or part of the time. Further consideration of these risk factors predicted almost as well as the Waterlow scale. This means that the overall Waterlow scale included risk factors that were not relevant to individuals in wheelchairs, and as such using an overall Waterlow score as a determinant of risk status may underestimate risk among wheelchair users. Others argue that risk assessment needs to focus on where the person usually spends their time (Bain and Ferguson-Pell, 2002). In doing this, the aim is to assess the individual's sitting habits, where upon they may inadvertently be placing more pressure on one buttock than the other. Furthermore, active repositioning may be erratic, thus remote pressure logging may be useful in determining these disparities. In other words, a one-off assessment of seating and repositioning practice may not give a true picture of an individual's daily activities in this regard. As such, it may be of value to use monitoring of patients while they are at home, or undertaking their usual activities outside the clinic setting, to enable achievement of an accurate record of actual seating and repositioning practices (Bain and Ferguson-Pell, 2002). Changes in usual habits may also be identified, for example a reduction in usual activities arising due to illness or depression.

PREVENTION STRATEGIES IN THE SEATED PERSON

Development and implementation of prevention

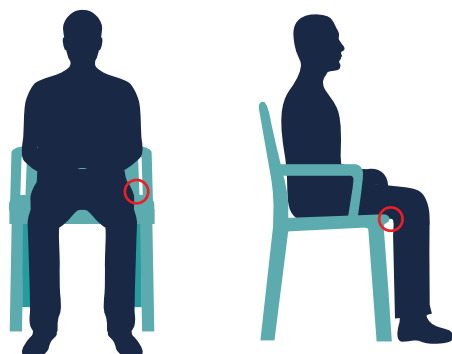


Figure 2. Ideal chair width, depth, and height for a seated individual. With one-finger depth between side support and body and one finger space between inside knee and seat, knees at 90 degrees.

strategies targeted at the individual needs of the seated person should include consideration of the type of seat employed, the pressure redistributing surface in use and the type and frequency of repositioning.

THE SEAT

In choosing a seat for an individual, the three aspects of importance are the width, the depth and the height of the chair. If the chair is too small, the person will be squashed into the chair. This creates a pelvic obliquity and rotating of the spine, leading to seating instability. Conversely, if the seat is too wide the user will also lose seating stability, because the sides of the chair support and help to stabilize the pelvis. The general rule for those confined to a chair is that the seat should be as small as possible, with just a finger width space on each side between the body and the side supports (Tissue Viability Society, 2009) (Figure 2).

The depth of the chair is also of importance, if the seat is too long, contact between the calves and the front of the seat will force the person to slide forward in the seat. The person will adopt a slouched position and shear forces in the buttocks will increase, putting pressure on the coccyx. Conversely, a seat depth that is too short will reduce the area on which the force is distributed, thus increasing the risk of pressure ulcer development over the weight bearing areas (Moore and van Etten, 2011; Moore and van Etten, 2015). If the feet are not supported, the person will lose stability and slide down in the chair, also

creating a slouched position and increased pressure on the coccyx (Moore and van Etten, 2011; Moore and van Etten, 2015). The height of the chair also influences the stability of the seated person. The position of the feet should allow the knees to be placed at approximately 90 degrees. If the feet are positioned too far forward, stretch on the hamstrings will tilt the pelvis backwards, sliding the user out of the chair, causing a slouched position and increasing pressure on the coccyx (Moore and van Etten, 2011; Moore and van Etten, 2015).

THE SEATED SURFACE

Using an appropriate pressure redistributing cushion on the seat is an important component of pressure ulcer prevention in the seated person. Furthermore, choosing the right pressure redistributing cushion will enhance the comfort of the person and will also increase the length of time they can remain seated (Moore and van Etten, 2015; Lorakker et al, 2010). The 2014 international pressure ulcer prevention and management guidelines recommend the use of a pressure redistributing seat cushion for individuals sitting in a chair whose mobility is reduced. Additionally, the guidelines stress the importance of ensuring that the selection of a pressure redistributing seat cushion is appropriate to the individual (NPUAP, 2014).

The idea behind the use of a pressure redistribution cushion is to reduce tissue deformation. This is achieved by two concepts known as immersion and envelopment (Van Etten, 2014). Immersion is defined as 'the depth (sinking) of penetration into a support surface' (NPUAP, 2007). In order for immersion to occur, the person needs to be able to sink into the material, but not to sink in completely where the cushion will bottom out. This happens if the cushion is too soft or too thin. The higher the cushion, the greater the possibility for immersion (Van Etten, 2014). Conversely, if the cushion is too hard, there will be no immersion because the person cannot sink into the cushion. The person will actually balance on the top of the cushion thereby decreasing stability and increasing tissue deformation (Van Etten, 2014). Envelopment is the ability of the material to encompass the contours of the human body. It has been defined as 'the ability of the support surface to conform, so as to fit or mould

around irregularities in the body' (NPUAP, 2007). Envelopment equalises pressure and stabilises the person. The greater the capacity for envelopment, the greater the reduction in tissue deformation (Van Etten, 2014). More split in a material improves the envelopment potential, whereas a thicker material enhances the immersion potential (Van Etten, 2014). Careful consideration should be given to the material used in the cushion; many foam types will, due to their inert cell structure, increase tissue deformation where you want it least, for example, under the ischial tuberosities (Levy et al, 2014). Air and fluids need to be placed into a storage container within the pressure redistributing cushion and the surface size of this container should be larger compared to the amount of fluid and air within it. This will ensure that the person may immerse and be enveloped by the material (Levy et al, 2014).

REPOSITIONING

Repositioning is considered to be an integral component of pressure ulcer prevention strategies. There are two key aspects to consider, the frequency and the method of repositioning. Both these aspects should be intertwined with consideration of the impact on the individual's quality of life (Moore et al, 2011).

The 2014 guidelines highlight that the seating duration should not exceed 2 hours, particularly in acutely ill individuals (NPUAP et al, 2014). However, some patients may only be able to tolerate sitting for shorter durations and a careful assessment of the patient and their response to sitting should influence care planning (Moore and van Etten, 2011).

Repositioning can be challenging as the traditional method — pushing up and holding the armrests or wheels — requires coordination, balance, consistency and good upper body strength (Sprigle and Sonenblum, 2011). As a result, many persons do not carry this out effectively, suggesting that other methods of repositioning should be considered (Moore and van Etten, 2015). The main aspects of repositioning to consider are the impact of the chosen position on the person's stability, security and comfort. The 2014 guidelines add the importance of ensuring the person is enabled to maintain his or her full range of activities

(National Pressure Ulcer Advisory Panel et al., 2014). Furthermore, the position chosen should be acceptable for the individual and should also minimise the pressures and shear exerted on the skin and soft tissues (NPUAP, 2014).

Pressure may be redistributed through the use of chair tilting and self-positioning programmes (Stockton and Flynn, 2009). One technique is to let the individual lean forward, resting with their elbows on their knees, use of a specific positioning cushion on the lap will increase security. In this position, the pressure over the ischial tuberosities is redistributed, and decreasing temperature and humidity in the weight bearing area is reduced (Figure 3) (Stockton and Flynn, 2009). If the patient can stand, pressure may be relieved at regular intervals in this way. However, it is important to allow sufficient time during each standing episode. Allowing the patient to rest in bed for periods throughout the day will relieve pressure and also reduce fatigue, thereby enhancing wellbeing (Gebhardt and Bliss, 1994). Indeed, Bliss (2004) argues that individuals need periodic episodes of lying down during the day to ensure that they have adequate rest. In addition, Alhola and Polo-Kahtola (2007) note that this rest is fundamental to enhance cognitive performance.

STABILITY AND LOAD MANAGEMENT

The advantages of seated stability are: 1, a reduction in sliding forward or sideways (thus reduced tissue deformations); 2, increased (functional) mobility (proximal stability gives distal mobility); 3, increased comfort; 4, less pain; and 5, less fatigue. But repositioning, besides a change in seat angle

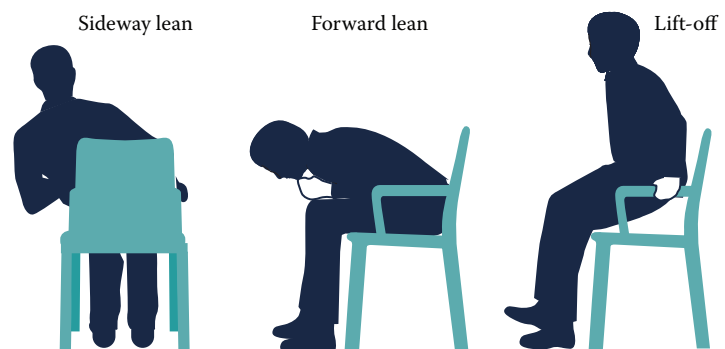


Figure 3. Self-repositioning technique

Box 1. Practice key points

- ▶ Pressure ulcers are a devastating consequence for seated individual
- ▶ Risk assessment is a precursor to planning prevention strategies
- ▶ Assessment and prevention should be person centred, reflecting the lifestyle and preferences of the individual
- ▶ Prevention should include consideration of the type of seat employed, the pressure redistributing surface in use and the type and frequency of repositioning
- ▶ Prevention should also take into consideration whether the individual already has an existing pressure ulcer
- ▶ All assessment and prevention should be recorded and re-evaluated in response to the tolerance of the individual to strategies employed.

(tilt in space chairs) or through leaning forward with support on the knees, will be challenging — these changes will nearly always cause a corresponding change to the pelvis position and since a properly aligned chair is quite small, this can only happen if the pelvis is moved forward, thus causing a slouched position. For a physically weak person, returning to the 'proper seated position' may be nearly impossible without the help from a carer.

Appropriate load management that increases the potential seating time (i.e. a cushion with good immersion and envelopment properties) and regular repositioning can be conflicting in action. For example, the more an individual is immersed and enveloped by the cushion material, the more difficult it will be for this person to reposition. Therefore, a person with impaired mobility or muscle weakness will be more depending on carers to perform a reposition.


SEATING AMONG THOSE WITH EXISTING PRESSURE ULCERS

For individuals with existing pressure ulcers, it is fundamental that the potential for wound healing is maximised (Moore and Cowman, 2015). For this to occur, the wound requires an adequate blood supply, since the metabolic need of the wounded area is great (Iocono et al, 1998). Furthermore, normal cellular metabolism requires

an adequate supply of oxygen and nutrients, and also an effective elimination of waste metabolites (Iocono et al, 1998). If the pressure ulcer exists over a weight-bearing area whilst seated, the pressure and shear forces the individual is exposed to continue to cause cell deformation and impaired lymphatic drainage, resulting in oxygen and nutrient deprivation to the affected area (Oomens et al, 2014), and wound healing potential is severely impeded. For this reason, the international pressure ulcer prevention and management guidelines advise that, if seating is necessary among those with existing pressure ulcers, this should be for as short a time as possible, perhaps as little as three times a day for 60 minutes or less at each sitting episode (NPUAP, 2014).

CONCLUSION

Pressure ulcer development is a particular risk in those who spend protracted periods of time in a seated position. Owing to the devastating affect that pressure ulcers have on the individual, it is imperative that all due measures are taken to prevent these wounds from developing in the first instance. At the outset, identifying those at risk is the first step; this should be followed by development of an individualised prevention care plan, which is suitable for the needs of the patient.

In the seated individual, it is important to ensure that the following factors are taken into consideration: choose a chair that fits the individual correctly, choose arm rests that are of the correct height and position relative to the chair, which should be fitted with an appropriate pressure redistributing device. Following this, the chosen seated position should maximise the individual's ability to undertake usual activities, whilst offloading at regular intervals. Once the individual feels secure and stable in the seated position, they are at lower risk of the adverse effects of pressure and shear forces, and, as a result, will be at reduced risk of pressure ulcer development. All interventions should be recorded and re-evaluated according to the responses of the individual. 

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