

Repositioning and pressure ulcer prevention in the seated individual

The presence of a pressure ulcer impacts negatively on the individual's quality of life and may contribute to increased mortality. Pressure ulcers develop due to exposure to prolonged, unrelieved external mechanical forces. For the seated individual, the risk is greater than for those nursed in bed. This is due to the relatively small surface area which is absorbing the high pressures. Repositioning is advocated by international guidelines as being central to the prevention of pressure ulcers. This article will discuss the key considerations in the use of repositioning for the seated individual.

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KEY WORDS

Pressure ulcers
Prevention
Seating
Repositioning

Pressure ulcers are common and costly, impacting negatively on health and social gain (Moore et al, 2011). Pressure ulcers will only occur when individuals are exposed to prolonged externally applied mechanical forces (Bader, 1990). Therefore, pressure ulcers mainly occur in those with mobility/activity difficulties, as these impact on the individual's ability to alter their position, which relieves pressure over bony prominences. The ability to reposition is often diminished in the very old, the malnourished and those with acute illness (Fisher et al, 2004; Lindgren et al, 2004; Robertson et al, 1990). Those with spinal injury and musculoskeletal disorders are also at high risk of immobility. Changing population demographics and the expected rise in

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the number of elderly persons, suggest that pressure ulcer prevalence and incidence is set to increase (Moore and Cowman, 2011). Pressure ulcers can be prevented by determining those who are most at risk and implementing effective prevention strategies (Moore et al, 2011). Repositioning is a powerful yet practical preventative measure that

Pressure ulcers can be prevented by determining those who are most at risk and implementing effective prevention strategies. Repositioning is a powerful yet practical preventative measure that is within the domain, power and control of all healthcare professionals (Moore et al, 2011).

is within the domain, power and control of all healthcare professionals (Moore et al, 2011). This article focuses on repositioning as a component of pressure ulcer prevention in the acutely ill seated individual.

Impact of external mechanical forces on tissues

The exact mechanisms by which externally applied mechanical forces result in pressure ulcer development are not clearly understood (Bader, 1990;

Bader and Oomens, 2006; Stekelenburg et al, 2008; Stekelenburg et al, 2006). However, it is postulated that there are four mechanisms within three functional units which lead to pressure ulcer development (Stekelenburg et al, 2008). The functional units are the capillaries, the interstitial spaces and the cells (Nixon et al, 2005). The mechanisms are:

- ▶▶ Local ischaemia
- ▶▶ Reperfusion injury
- ▶▶ Impaired interstitial fluid flow and lymphatic drainage
- ▶▶ Sustained deformity of cells (Bouten et al, 2003; Stekelenburg et al, 2006).

The external forces which probably cause the internal effects described above are:

- ▶▶ A vertical force (pressure deformation)
- ▶▶ A horizontal force (shear deformation)
- ▶▶ Microclimatic factors, as a build up of temperature and humidity.

Pressure is when bony prominences squeeze and stretch the surrounding soft tissues, deforming those and causing the mechanisms described above (International review, 2010). Shear is, for example, when an individual is seated the pelvis slides forward. The skin stays in one place, while the bony structures move forward, causing a stretch deformation of soft tissue (International review, 2010). Friction occurs when the skin rubs on the surface. Microclimate is an issue when heat

and moisture build up between the seating surface and the body structures influencing the soft tissue 'well-being' (International review, 2010).

Defloor (1999) posits that there is a conceptual scheme for pressure ulcer development that includes four elements:

- ▶▶ Pressure
- ▶▶ Shearing force
- ▶▶ Tissue tolerance for pressure
- ▶▶ Tissue tolerance for oxygen.

Primarily, Defloor (1999) argues that pressure is key, as without pressure there cannot be shearing forces. Furthermore, the intensity and duration of pressure are fundamental in the subsequent development of tissue damage (Defloor, 1999).

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 7–8cm 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 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).

Repositioning the seated individual

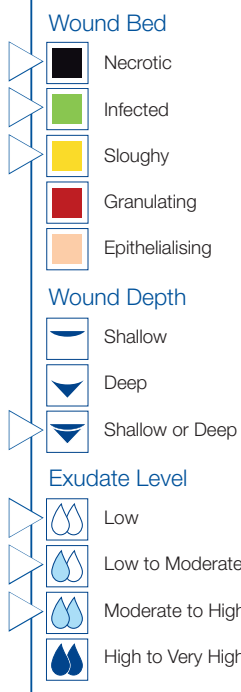
The prevention of pressure ulcers involves a myriad of different interventions, including:

- ▶▶ Nutritional care (European Pressure



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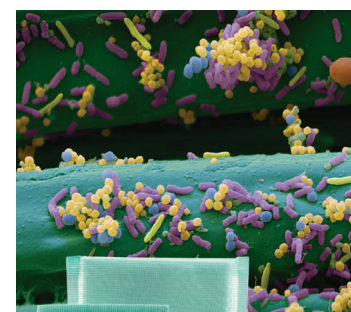
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Ulcer Advisory Panel [EPUAP]/ National Pressure Ulcer Advisory Panel [NPUAP], 2009)

- ▶▶ Pressure-reducing/relieving surfaces (McInnes et al, 2008)
- ▶▶ Skin and wound care (Helberg et al, 2006).

Repositioning patients is also an important component in the prevention of pressure ulcers, and involves moving the individual into a different position to remove or redistribute pressure from a particular part of the body (Krapfl and Gray, 2008).

Repositioning is affected by the individual's ability to feel pain and actual physical ability to move or reposition themselves (Defloor et al, 2005). In the absence of the patient having the ability to reposition, they require assistance. Indeed, the central link between immobility and pressure ulcer development is well founded in the literature (Moore and Cowman, 2011; Moore et al, 2011).

Repositioning the seated individual should take into account whether the individual is acutely or chronically immobile (Stockton et al, 2009). The rationale for this consideration relates to the need to include long-term lifestyle and functional capacity in care planning (Stockton et al, 2009). Furthermore, cognitive ability, motivation and degree of immobility also influence the choice of repositioning technique (Stockton et al, 2009).

Planning pressure ulcer prevention in the acutely immobile individual involves deliberation of the following:

- ▶▶ Risk assessment
- ▶▶ Type of chair
- ▶▶ Sitting position
- ▶▶ Duration of sitting
- ▶▶ Method of repositioning
- ▶▶ Use of pressure redistribution devices (Stockton et al, 2009).

Risk assessment

Pressure ulcers occur due to prolonged unrelieved exposure to externally applied mechanical forces (Kosiak, 1959; EPUAP/NPUAP, 2009). Those who are vulnerable to exposure to this pressure are the immobile, with the older person population demonstrating the

highest propensity to mobility problems (Bergstrom et al, 1996; Casimiro et al, 2002; Goodridge et al, 1998; Moore, 2008). Therefore, it is logical that activity and mobility are the highest predictors of risk, as it is these factors that cause an individual to be exposed to pressure. If the individual does not demonstrate mobility or activity problems, other factors such as nutrition, incontinence and age are not relevant in terms of pressure ulcer risk, because the individual must firstly be exposed to prolonged, unrelieved external mechanical loading (Moore et al, 2011). Thus, it is postulated that there are a combination of factors interplaying which lead an individual to be susceptible to pressure ulcer development — pressure and shear; time and the individual (Defloor, 1999).

Pressure and shear must be present for a pressure ulcer to develop, with the effect of pressure and shear being time-dependent. The time it takes a pressure ulcer to develop will be influenced by the general condition of the individual (Moore and Cowman, 2011). As such, the authors argue that the risk assessment process should begin with an assessment of mobility and activity, followed by a more complete assessment should these impairments be identified. In this way, the process is simplified and focuses attention to the key causative factor, namely, pressure.

Type of chair

Stockton et al (2009) suggest that there are a number of important considerations when planning seating for a dependent individual. These relate to the chair itself and to the posture the individual adopts when seated. A backrest that is designed to follow the shape of the back increases the contact area and reduces pressure on seating and the risk of sliding forces (Stockton and Flynn, 2009).

The chair should be the right height, so that the patient can sit comfortably with their feet on the floor or on a foot rest, as appropriate (EPUAP/NPUAP, 2009). When the person is seated, their position in the chair should be checked to ensure that no aspects of the chair are pressing into the knees or thighs, which could cause a pressure ulcer to develop

in these areas (Stockton et al, 2009). The chair also needs to be of the correct width to accommodate the patient, including the pressure-reducing device in use (Stockton et al, 2009). If the chair is too narrow, this may cause excess pressure on the hips leading to an increased risk of pressure ulceration. Alternatively, if the chair is too wide, this may cause instability or pelvic obliquity leading to increased pressure and shear forces (Sprigle et al, 2003). Furthermore, the movements of the patient will be restricted, which again increases pressure ulcer risk and a feeling of insecurity in the chair (Stockton et al, 2009).

There is no one position that is suitable for all persons. However, seating stability, ease of transfer and maintenance of functional ability are key influencing factors in posture selection for the seated individual (Stockton et al, 2009). The posture the patient adopts will influence the likelihood of pressure ulcer development. Therefore, bearing in mind that more regular repositioning reduces the incidence of pressure ulcers (Moore et al, 2011), the position of the person should be checked often, by the individual responsible for the care of the patient. The EPUAP and NPUAP (2009) guidelines suggest that the posture adopted should ensure that exposure to pressure and shearing forces is minimised. Furthermore, the position should not adversely influence the individual's ability to carry out their activities of daily living (EPUAP/NPUAP, 2009).

Sitting position

Factors to consider are the position of the pelvis, thighs and legs, as well as the upper body, head and arms (Stockton and Flynn, 2009). In a generically seated position, the pelvis should be in almost the same alignment as when standing, with the thighs horizontal and facing forward. The upper body should be in approximately the same curvature as when standing, with the head in a central position. The arms should be relaxed on the armrests (Stockton and Flynn, 2009). The legs should be positioned so that both the legs and heels are at the front of the seat. This is important because the hamstring muscles connecting the pelvic area with the lower legs are quite short. A forward position of the feet will increase the internal tension in



these muscles, forcing the pelvis backwards, inducing a sliding of the pelvis (Sprigle et al, 2003). This creates shearing forces in the buttocks which can lead to pressure ulcer development (Stockton and Flynn, 2009).

Many factors can influence the ability to sit correctly, such as muscle length, physical changes due to age, or disabilities and mental status (Masso et al, 2009). Physical change due to age is often seen in the shape of the back, where the lumbar spine is flattening out, leading to a more rounded thoracic spine with the head in front of, rather than on top of, the body (Andersson 1998). This hunched up/slouched position often leads to reduced balance and, when seated, to find balance, one will slide down in the chair increasing the shear forces in the seated area (Sprigle et al, 2003; Stockton and Flynn, 2009).

Duration of sitting

When seated, the risk of developing a pressure ulcer is increased due to the relatively small area of the body which is carrying the entire load (EPUAP/NPUAP, 2009). Therefore, it is recommended to reduce the duration of sitting to less than two hours at any one time (Stockton et al, 2009). 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 out should influence care planning. Specifically, the skin should be assessed for changes in integrity, including localised heat, oedema or hardness. Furthermore, the comfort of the patient should be noted (EPUAP/NPUAP, 2009). Allowing the patient to rest in bed for periods throughout the day will relieve pressure and also reduce fatigue, thereby enhancing well-being (Bliss, 2004). The specific length of time the patient rests in bed during the day will be influenced by the individual needs of the patient, however, it is important to ensure that repositioning continues while in bed (Moore and Cowman, 2011).

Method of repositioning while seated

Repositioning the acutely ill patient while seated is a challenge and, as such, there is little advice available in the literature (Stockton et al, 2009). Despite this, repositioning remains central to the success of any pressure ulcer prevention strategy (Moore et al, 2011). Pressure may

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be redistributed through the use of chair tilting and self-positioning programmes (Stockton et al, 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. For the acutely ill patient, rest periods in bed are important in terms of pressure relief and health-related quality of life (Bliss, 2004).

Repositioning techniques for seating are comparable with transfer techniques. When seated, the individual will usually either slide forward in the chair or lean sideways, or use a combination of sliding and leaning (Aissaoui et al, 2001). To reposition a person who slides forward, one method is to place the individual's feet on a little plateau (5–10cm high), allow the individual to lean forward as if standing up (Stockton et al, 2009), and when the buttocks leave the chair give a little push backwards on the shoulders or pelvis or knees and the individual will be seated further back in the chair.

Another technique is to have the feet on a small plateau, allow the individual to lean sideways and give a backward push to the knee on the other side. A sliding material under the pelvis will make this method even easier. Allow the individual to lean over to the other side and push the knee again. Repeat this a few times per side and the individual will be positioned into the rear of the chair. For those leaning over to one side, the important point is to have the pelvis repositioned at equal height on both the left and right. When the upper body is pushed back vertical with the pelvic obliquity, which happens when leaning sideways, this will force the upper body back to a sideways lean. Pelvic obliquity also increases pressure relief on the lowest side. Both techniques described above can be used to reposition the pelvis to a central and equal position on the chair (Stockton et al, 2009). The number of healthcare personnel required for these movements will be influenced by the ability of the patient to participate in the activity. In the absence of patient ability, two personnel will be required, if the patient can assist, one will be sufficient. Education and training are important to ensure that these

movements are carried out correctly. The physiotherapist is an ideal person to offer support and advice.

In seating, offloading is frequently used. The most common offload technique of pushing up, holding the armrests or wheels, is a challenging exercise for many people and also demands a lot of coordination (Sprigle and Sonenblum, 2011). An easier technique is to let the individual lean forward resting with their elbows on their knees, thus relieving the ischial tuberosities from pressure and decreasing a build up of temperature and humidity (Stockton et al, 2009). The individual can be seated quite securely in this position. A specific positioning cushion on the lap will also further increase security.

Use of a pressure redistribution device in the chair

The underlying principles for use of specialised seating cushions are to redistribute pressure and to dissipate heat and humidity. All patients at risk of pressure ulcer development due to activity and mobility difficulties should have a suitable pressure redistributing cushion in use (EPUAP/NPUAP, 2009). The first issue of concern in cushion selection relates to comfort: the cushion should be acceptable to the patient and should not impede activities of daily living (EPUAP and NPUAP 2009). Further considerations in cushion selection relate to the following individual patient factors:

- ▶▶ Highly localised stresses
- ▶▶ Heat accumulation
- ▶▶ Moisture accumulation
- ▶▶ Poor sitting posture and positioning
- ▶▶ Poor trunk stability
- ▶▶ Degree of sensation
- ▶▶ Regular relief of stresses by movement (Ferguson-Pell, 1992)

There is limited evidence to suggest which pressure redistribution cushion is most effective (McInnes et al, 2011). As patient factors play a key role in selecting the most appropriate system, it is wise to seek advice from a seating expert. Pressure forces are strongly dependent on the cushion material features and how the pressure is redistributed by the cushion (Sprigle et al, 2003).

Seating materials have a redistributing effect in two ways: immersion (how far it is possible to sink into the material) and envelopment (capability of a support surface to deform around and encompass the contour of the human body) (Sprigle and Sonenblum, 2011). Different materials accommodate body loads in different manners. Foam and air are compressed, whereas fluids are displaced. However, compression and displacement are dependent on the size of the bladder (fluids and air) and the tension of the cover (Sprigle and Sonenblum, 2011).

Sitting on foam induces compression, putting a tension and stretch on the material. This stretch makes foam hard during immersion deep into the material, yielding envelopment more difficult. Fluid materials in a container (bag) larger than the contents, ensure that the fluids will be displaced. Displaced fluid immerses the body and envelops body contours (Sprigle and Sonenblum, 2011).

The cushion should be of sufficient depth to allow the bony structures to be immersed properly. For shear forces, the material's horizontal stiffness is of importance. A material which moves with the horizontal forces will reduce the effects of the bony prominences moving within the soft tissue (Sprigle and Sonenblum, 2011). Materials which need time to warm up also need time to cool down. Temperature loggings on the buttock interface suggest that for every offloading or repositioning an individual makes, the temperature will fall drastically. This, in turn, reduces the adverse effects of microclimate on skin integrity (Sprigle and Sonenblum, 2011).

Role of the multidisciplinary team


To achieve success in pressure ulcer prevention, all the members of the multidisciplinary team are needed, as no one profession has all the required skills (Gottrup et al, 2001). Indeed, Lindholm et al (1999) outline that limited availability of adequately trained personnel and equipment compounds the suffering of patients and increases costs to an already over-stretched health budget. In terms of pressure ulcer prevention and seating, the occupational therapist and physiotherapist provide

an important resource related to equipment and position selection, in addition to education and training. It is therefore important to include all members of the team to ensure the best outcomes for the patient (McCulloch, 1998).

Conclusion

Pressure ulcers are common, costly and impact negatively on health and social gain. They occur in those who are exposed to unrelieved external mechanical forces, with activity and mobility factors being the highest predictors of pressure ulcer risk. The older population display the greatest propensity for pressure ulcer development due to problems with activity and mobility. Furthermore, those with spinal injury and musculoskeletal disorders, for example, are also at high risk of immobility.

Repositioning is a key component of pressure ulcer prevention strategies. It is important that this should be undertaken not only when the individual is in bed, but also during seating. All members of the multidisciplinary team have a role to play in pressure ulcer prevention, and the skills and expertise of the physiotherapist and occupational therapist may be of particular value.

During seating, the individual's health and well-being and specific activities of daily living need consideration. Repositioning should not adversely impact on health-related quality of life, which should be balanced against the need for effective pressure relief. The chosen method of repositioning should be determined after an assessment of the individual needs of the person and monitored through accurate and ongoing assessment. All components of pressure ulcer prevention strategies need to be actively implemented to ensure a reduction in prevalence and incidence figures. In doing so, each healthcare provider will be actively participating in the guidance from the National Patient Safety UK '10 for 2010' programme, by working towards preventing all preventable pressure ulcers (National Patient Safety Agency [NPSA], 2010). 




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Key points

- ▶▶ Risk assessment should be conducted to identify those with activity and mobility difficulties.
- ▶▶ Repositioning the immobile seated individual is central to the success of pressure ulcer prevention strategies.
- ▶▶ Assessment of the individual and their skin will help to determine their tolerance of the planned repositioning regimen.

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