Society of Tissue Viability

Understanding the association between pressure ulcers and sitting in adults

What does it mean for all of us?

Seating guidelines

for people, carers and health & social care professionals

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Sharing of Expertise

Understanding the association between pressure ulcers and sitting in adults: What does it mean for all of us? Seating guidelines for people, carers, health and social care professionals.

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Who has been involved

While revising the guidelines, we engaged in activities to gather feedback from health and care professionals, industry partners, and individuals who spend extended periods sitting down. These activities included:

1. A listening session with Occupational Therapists from Lancashire County Council
2. An anonymous poll conducted during the European Wound Management Association and Society of Tissue Viability Conference
3. Reaching out to service user groups representing diverse perspectives

Plain English

To ensure that everyone has access to evidence-based health information regarding the prevention and management of pressure ulcers when seated, the authors have ensured the following guidelines have been written in plain English. This is to enable all people to make informed decisions about health and care. The guidelines have also been peer reviewed by people who remain seated for long periods of time to ensure language is appropriate and easy to understand by all users of this document.

What words mean

To ensure the guidelines are easy to read globally, the term pressure ulcer will be used throughout. Pressure ulcers may be referred to as bed sores, pressure injuries and decubitus ulcers in other literature.

The term ‘people’ is used for service users, patients or residents.

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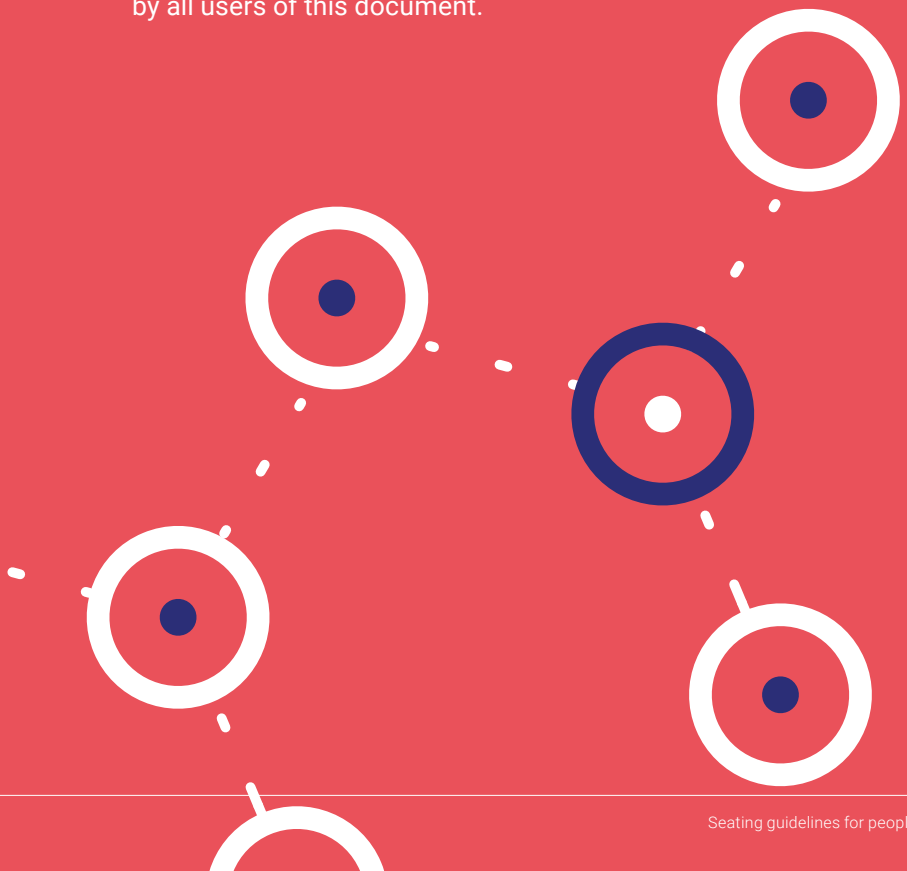

Sharing of Expertise

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Why are the guidelines relevant and why have they been reviewed?

This third version of the seating guidelines aims to deliver a practical guide, using the most up to date research and evidence on pressure ulcer prevention and management. This guide can be applied to those who remain seated for extended periods of time across health and social care settings. In the UK, over 700,000 patients are affected by pressure ulcers each year; 180,000 of those are newly acquired and their treatment is estimated to cost the NHS £3.8 million every day[1].

Who are these guidelines for?

These guidelines have been written for people living or working in health and social care:

- People
- Carers
- Health and Social Care professionals
- Education and training staff
- Independent sector (private or independent health and social care providers)
- Industry

Background

A pressure ulcer is localised injury to the skin and/or underlying tissue usually over a bony prominence, as a result of pressure, or pressure in combination with shear'[2]. Remaining seated for extended periods of time increases the risk of pressure ulcer development over the buttocks, as the soft tissue in this area is squashed between two surfaces: the seat and the bones in the bottom[3,4,5]. This leads to soft tissue distortion and deformity which can impair blood flow and removal of waste products by the lymphatic system[6]. How long this damage to the skin takes varies a lot as some pressure ulcers develop quickly and others take much longer[7]. The degree of damage depends on magnitude and duration of the seated pressures. It can also be influenced by other factors such as health status, disability, ability to change position, and maintaining an upright-seated position without slumping or sliding[7]. Someone who is sitting upright typically shows three main sites of higher pressure: under the left and right ischial tuberosities (either side of the anus), the sacrum and coccyx at the base of the spine, sometimes known as the tail bones. The ischial tuberosities take most of the load when sitting upright, the sacrum and coccyx take the load when sitting slumped.[8].

Depending on the magnitude of loading and vulnerability of the underlying skin and soft tissue, damage can occur over several hours in typical seated positions[9], or only minutes if there is a very high level of tissue distortion which can directly damage cells[10]. This is because the body weight is focused on a smaller area[11]. This results in high pressures over the bony points in the buttocks[12,13]. Extra pressure restricts the blood flow through the skin starving the area of oxygen and nutrients, and if this goes unrelieved, the tissue begins to break down, leading to the development of a pressure ulcer. Individuals with conditions that affect the central nervous system such as spinal cord injury and multiple sclerosis, can be at more at risk due to muscle wasting and reduced sensation, causing an increased risk when seated[14].

Definitions of Pressure, Shear and Friction

Pressure: Pressure is the external force, usually from the weight of the person's body, applied over an area of the body and which may vary over a bony prominence.

Shear: When moving on a seat or cushion the body can remain in contact with it and the skin can be pulled along that surface. Shear force is a force that acts parallel to a surface, causing it to deform or slide.

Friction: Friction is a force between two surfaces that are sliding, or trying to slide, across each other. For example, when you try to slide between a cushion and a transfer board, friction can make this difficult. Repeated friction on the skin surface can cause damage often seen as skin redness which is uncomfortable.

Pressure-ulcer prevention has focused on beds, with an array of approaches to redistribute lying pressures and offload vulnerable tissue sites. Seating - such as leisure chairs, armchairs, and wheelchairs – are often overlooked. Recent European and UK studies have highlighted an obvious disparity in the management of high-risk patients when seated, in comparison with how they are cared for in bed. Fewer than 50% of at-risk people receive specialist chair equipment including appropriate cushions, repositioning is often performed at irregular time intervals, and only a very small proportion of people are given care plans to prevent pressure ulcers whilst seated[15,16].

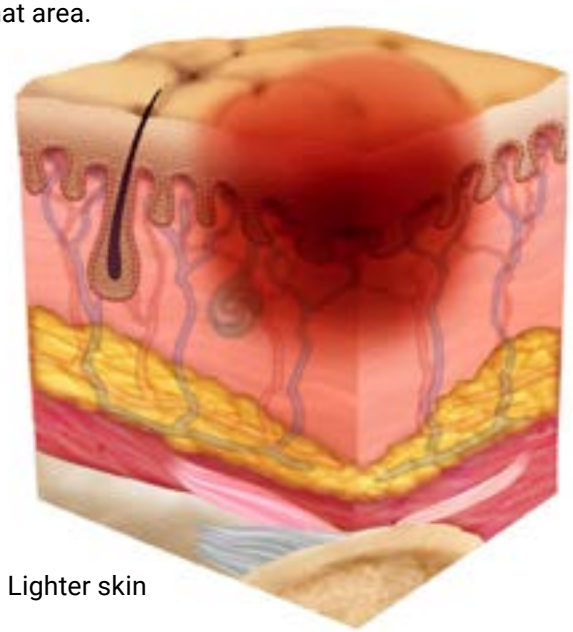
Seating guidelines

To help understand the severity of damage to the skin from pressure, a pressure ulcer staging system is used (Figure 1 - 6)[17,18]. The higher the stage the more severe the pressure ulcer and the damage to the skin and underlying tissues.

Category/stage one (Figure 1)

A category/stage one pressure ulcer is superficial damage. The affected area of skin appears discoloured (red in people with white skin, and purple/bluish in people with darker skin tones). The skin is not broken, but it may be painful, itchy, and feel warm and squishy, or hard on touching.

Blanching is when the redness goes away when the area is pressed and then comes back. In a category 1 pressure ulcer, the redness stays when the area is pressed, meaning there is little or no blood flow to that area.



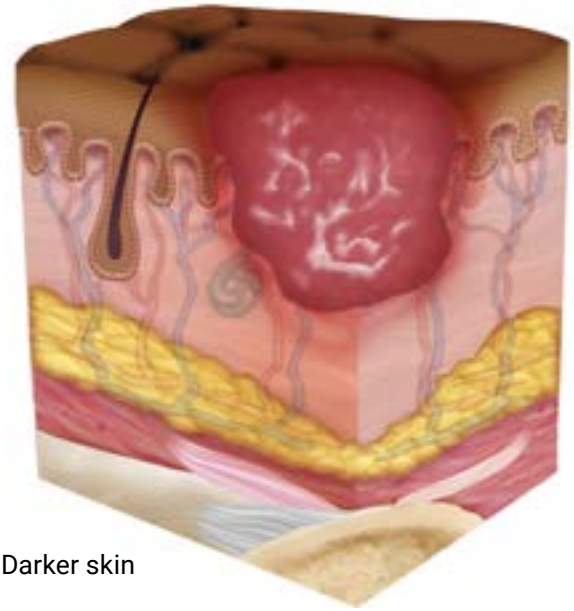
Lighter skin

Darker skin

Category/stage two (Figure 2)

A category/stage two pressure ulcer will look like a small open wound or a blister as the surface of the skin has been damaged.

Lighter skin



Darker skin

FIGURE 1-6 IMAGES SUPPLIED BY

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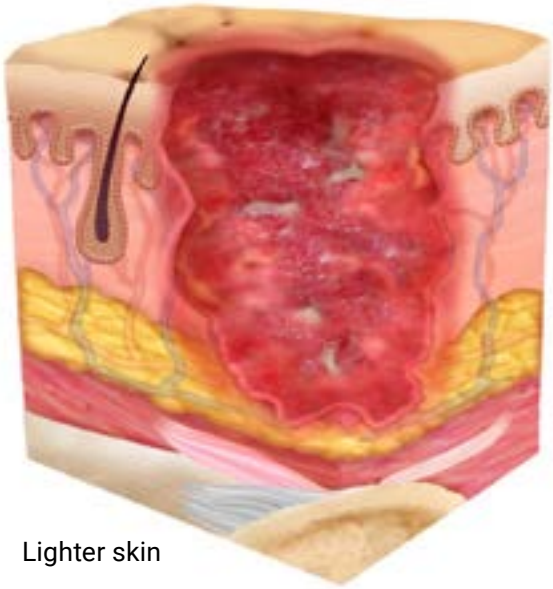
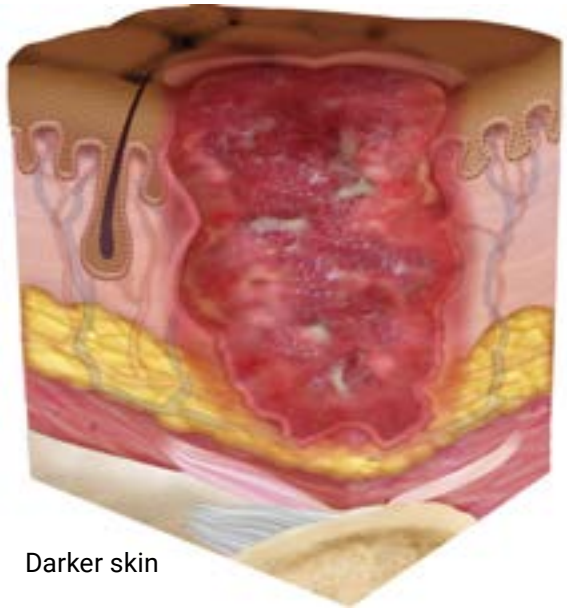
Seating guidelines

Category/stage three (Figure 3)

A category/stage three pressure ulcer can appear as deep opening of the skin depending where they are on the body. Damage has occurred to both the skin and soft tissues.



Lighter skin

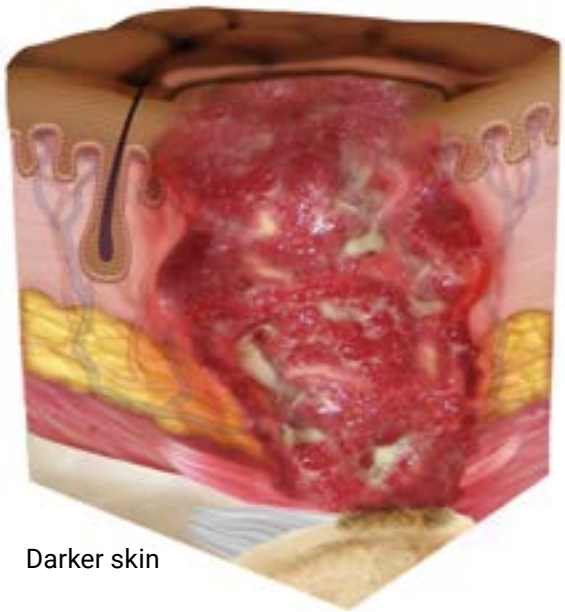


Darker skin

Category/stage four (Figure 4)

A category/stage four pressure ulcer is the most severe type. Damage has occurred to the skin, soft tissue, and muscle; bone may often be visible. People who develop pressure ulcers of this category can develop life threatening infections.

Lighter skin



Darker skin

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Seating guidelines

Unstageable (Figure 5)

An unstageable pressure ulcer is one that is covered with dead tissue however the extent of damage cannot be assessed until the dead tissue has been removed by a trained healthcare professional.

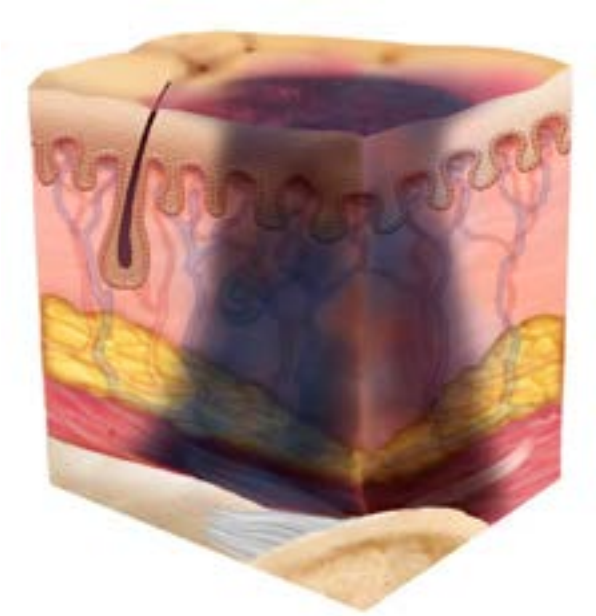
Lighter skin

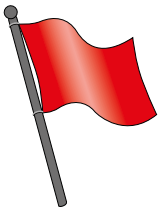
Darker skin

In England, recent changes in categorisation of some pressure ulcers have been made, it is important that health and care workers responsible for identifying pressure ulcers should read the guidance document by the National Wound Care Strategy Programme explanatory notes[17].

Suspected deep tissue injury (Figure 6)

A suspected deep tissue injury is where the intact skin looks purple or maroon in colour or may have a blood-filled blister. This is due to damage of the soft tissue and on touching may be painful, firm, mushy, boggy, warm or cool.





Red Flag

If an area of skin has changed colour (white skin to red or dark skin to blue or purple) check the skin.

White skin: lightly press on the red area, it should go white and when you remove your finger it should go red again. This is called the blanch test and is a normal skin reaction.

Dark skin: may not change when you apply touch with fingers, so check for other signs such as colour change, temperature change, swelling or hardness. These should subside within 15 minutes.

If the skin does not react (white skin) or subside (dark skin) seek professional advice

https://www.youtube.com/watch?v=THjmjtDDDoc

Seating guidelines

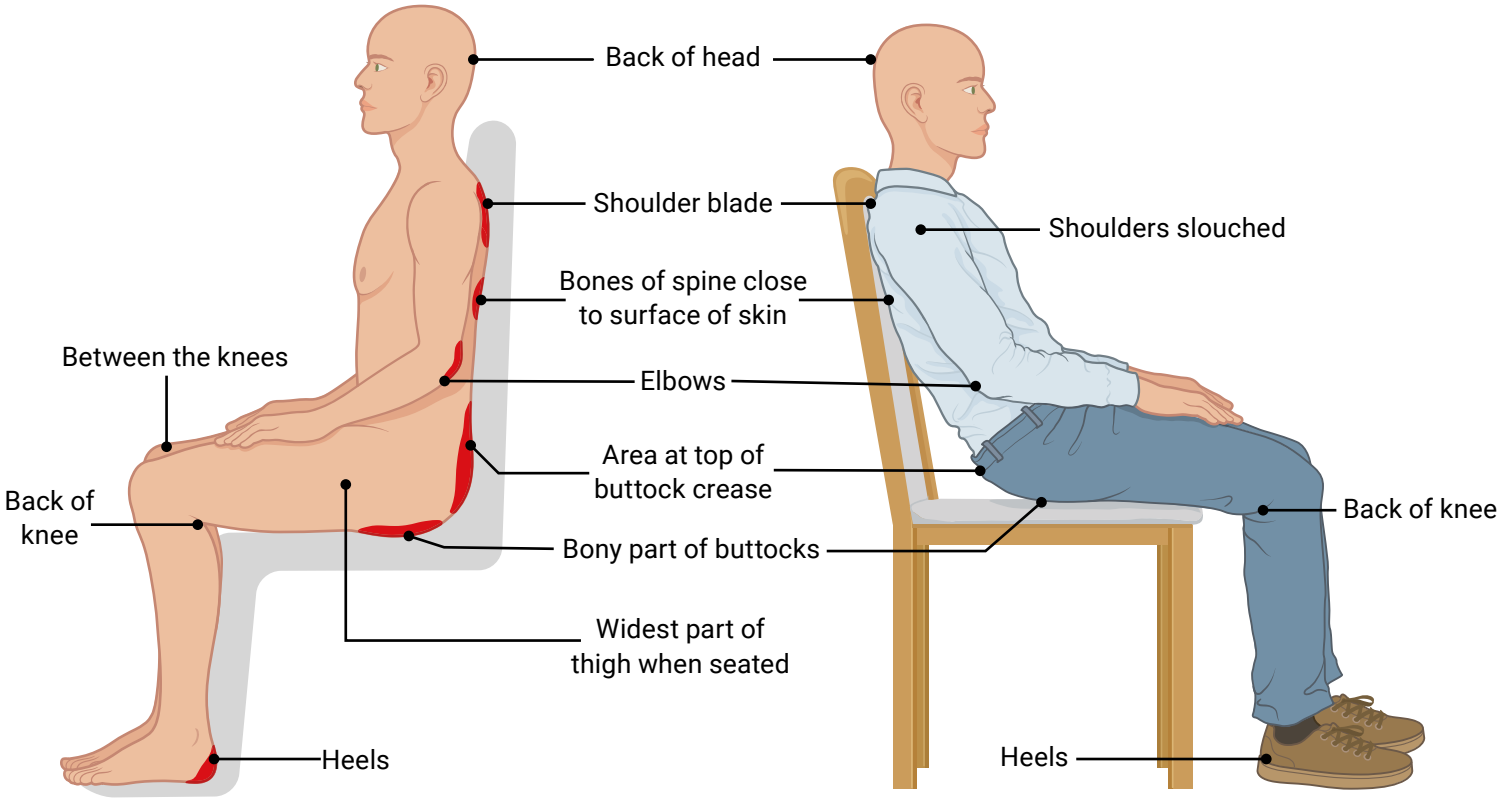
Pressure ulcers are often associated with people who lie in bed, however research indicates that people who sit for extended periods of time are more at risk of pressure ulcers developing[19].

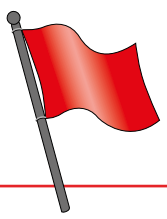
Even though sitting has been associated with pressure ulcers there is still a lack of evidence-based advice to help people make informed decisions regarding their day-to-day care in this area[20]. This document has been written to provide guidelines for the prevention and management of pressure ulcers for people who remain seated for extended periods of time.

The method used to obtain the evidence to inform this document is shown in appendix 1. The guideline covers all people with short and long-term mobility problems and is not condition specific, to avoid excluding certain population groups. Although formal definitions of short and long-term mobility are not available, the International Classification of Functioning, Disability and Health[21] provides context in comparison to other literature. The term seated for extended periods of time will be used instead of the long-term seated individual as this includes people with short and long-term mobility issues.

Where do pressure ulcers develop when seated?

Figs. 7 and 8. Areas at risk of pressure ulcer damage when seated and areas at risk of pressure ulcer damage when seated slouched in the chair.





Red Flag

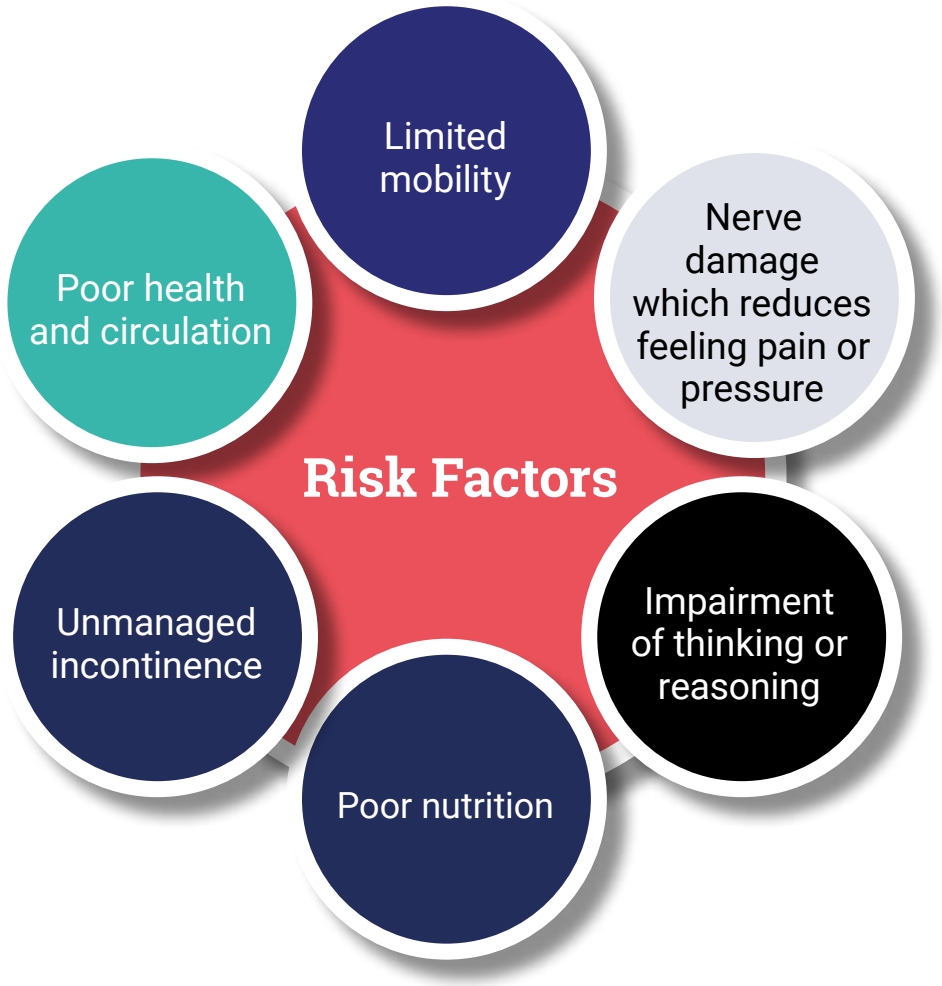
Additional risk areas encompass the palms due to manual wheelchair propulsion, the genital region from prolonged sitting, as well as equipment like catheters, leg bags, belts and slings attached to or positioned beneath individuals while seated[22].

Seating guidelines

Is there anything that increases a person's risk of developing pressure ulcers?

There are many different factors that can increase a person's risk of developing a pressure ulcer; these can include factors such as mobility/activity, perfusion (including diabetes), skin/pressure ulcer status, skin moisture, seated buttock soft tissue anatomy, age, haematological measures, nutrition and general health status, body temperature and immunity[23,24,25,26,27].

Figure 9: Risk Factors



The factors listed above are not exhaustive as there are other less common risk factors[23,24,25]. It is important to assess risk factors for pressure ulcer formation for people who are seated, as this will help those providing personalised interventions to be aware of the risks and provide appropriate care and equipment to reduce that risk. Health and social care professionals may use a risk assessment tool to help identify risk of developing pressure ulcers, so please talk to your care provider to help manage the risks [23,24,25].

Identifying risk factors for pressure ulcer formation in seated individuals is crucial, as it enables people and those who provide care and support to be aware of potential risks and implement appropriate care and equipment to reduce the risks[26]. Health and social care professionals may use a risk assessment tool, such as Purpose T, Waterlow or Braden, to identify the risk of developing pressure ulcers, so it's advisable to discuss the results with your health or social care provider[28].

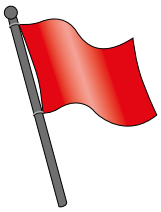
Seating guidelines

What is the optimal seated position and what seat adjustments are required?

Regardless of whether a person has a short or long-term mobility issue, there are essential factors that should be considered which are set out in Table 1[20,22]. Posture is a critical part of pressure ulcer prevention and can significantly affect the pressure and shear forces acting on the body[13].

Table 1: Factors to consider when assessing seating

Factor	Reasons
Chair seat width	The width of the seat is important as it can affect a person's posture and pressure areas. If a seat is too narrow it can lead to pressure damage to the hips, buttocks, and the area at the back of knees. If a seat is too wide, the person may feel unsupported which could result in poor posture and pressure problems with the hips and spine. This may also make it difficult to fix positioning equipment to the seating system such as hip and thigh supports. Good practice recommends a minimum of 2.5cm clearance between the hip and the side of the chair/wheelchair. A wide seat with limited side support may result in a side lean posture, increasing the risk of pressure damage whilst leaning on an elbow, or putting more weight through one side of the buttock. Less support may also increase the risk of falls if the person has difficulty maintaining a good upright seated posture.
Chair seat height	If a seat is too high, the individual may slide down the seat in order to place their feet on the floor or footplates to support themselves (Figure 10). This could also lead to increased pressure and or shear behind the knees and under the buttocks, leading to skin damage around the tailbone area. To check the appropriateness of the height of the seat for an individual make sure they can comfortably place their feet on the floor or foot-plate with the ankle ideally in a neutral position. Adding extra cushions will affect seat height and should be avoided.
Chair seat depth	If the seat depth is too long, this may cause sliding down in the seat to reach the front edge of the seat with the knees. The person is likely to slide forward to place their feet on the footplate or floor, affecting their posture, stability and an increase in pressure on the buttocks and back of the knees. Pressure ulcers may also occur against the back of the knee. If the seat depth is too short the thighs will not be fully supported resulting in reduced contact area with the seat cushion, increasing the risk of pressure damage. These pressures may be observed in both the upper thighs and buttock areas. Good practice recommends a minimum of 2.5cm clearance between the edge of the seat and the back of the knees (Figure 11).

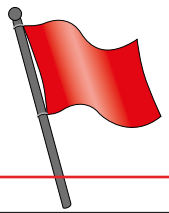


Red Flag

Using a footstool that is lower than the seat of the chair will not help reduce swelling (oedema) of the leg(s) and the position puts additional pressure on the tailbone and buttocks increasing the risk of pressure ulcers[29]. Footstools may also impede the sit to stand transfer and mobility[20]. There are many guidelines that healthcare professionals refer to when dealing with swelling of the legs and therefore their advice must be sought on what is considered appropriate for your condition, cause of swelling and if needed, aid for the protection of the skin around the heels.

Seating guidelines

Chair back rest	The backrest provides support and strength to the trunk. If the backrest is too low, it can lead to postural problems, weakened sitting balance and cause incorrect placement of supports for the shoulder/chest increasing the risk of pressure damage. It can also cause sliding in the chair as the person seeks to increase back support for stability thus increasing pressure in the sacral area. If the backrest is too high, it can push the trunk forward leading to an unstable posture and sitting balance. Shoulder blade movement can be reduced leading to postural problems in the trunk affecting sitting balance. This may affect function, such as wheelchair propulsion. Back width is usually set by the seat width but can be different with certain wheelchair/seat back choices. Chest width and the need for trunk supports are important considerations. If the back rest is too wide, it may hinder fixing supports and arm function. If the back rest is too narrow, it can result in the edges digging into the person's back increasing pressure damage risk and insufficient room for additional supports.
Chair seat to back angle	Seat to back angle is the angle of the back support in relation to the seat surface. If the back support is unnecessarily reclined it can lead to sliding down in the chair with resulting pressure damage. Sometimes back support recline is necessary to accommodate hip flexion limitations and to increase the contact area for pressure redistribution. Advice should be sought from a seating professional before using the recline mechanism on a chair. Often tilt and recline are used together for a person to achieve an optimal comfortable seated position.
Chair arm rests	Arm rests provide steadiness in sitting and help the person to transfer safely. Arm rests should have padding material to prevent pressure ulcers on the elbow, wrist and hand. Arm rest height needs to support the bent elbow when seated as well as the possibility of additional equipment such as trays and arm supports. If the arm rest is set too high, it can increase pressure on the elbow joint causing pain and discomfort. If the arm rest is set too low, it can create postural issues that contribute to pressure damage in the buttocks due to lack of support for the elbows, shoulders and trunk. Arm rest length varies depending on the amount of support required. If the arm rest is too long, it can stop the chair from being positioned under a table. If the arm rest is too short, it may result in difficulty with sit-stand transfers and may not support equipment such as lap trays.
Chair leg rests/ foot support	In the optimal seated position, the length of the leg rest should be set to ensure that the thigh is supported correctly on the seat with the foot comfortably placed on the foot support or floor. This provides the optimal amount of contact possible for pressure redistribution. Ankle and foot deformities need to be taken into consideration. If the leg rest length is too long, it can cause increased pressure on the buttocks and thighs and may result in the person sliding down in the chair to meet the footplates/floor. If the leg rest length is too short, it can increase pressure on the buttocks, calves and heels, which will be forced against the leg rest hangers. The standard setting of a foot support is a 90º angle, however people with fixed postural problems of the ankle will need the footplate adjusted to meet their needs.
Head support	A head support is important for people with weak neck muscles and who are unable to hold their head up independently. A head support can help with breathing and swallowing as well helping the person to maintain eye contact. Care should be taken as pressure can increase at the back of the head causing damage.



Red Flag: Recline should not be confused with tilt where the whole seat frame tilts backwards whilst the person's seated posture stays the same. If recline is used incorrectly, the person may not be able to maintain an adequate seated posture and slide/slump down the chair, increasing their risk of skin damage from pressure, shear and friction, and increasing the risk of falling out of the chair.

Seating guidelines

Figure 10: Seated position too high and low

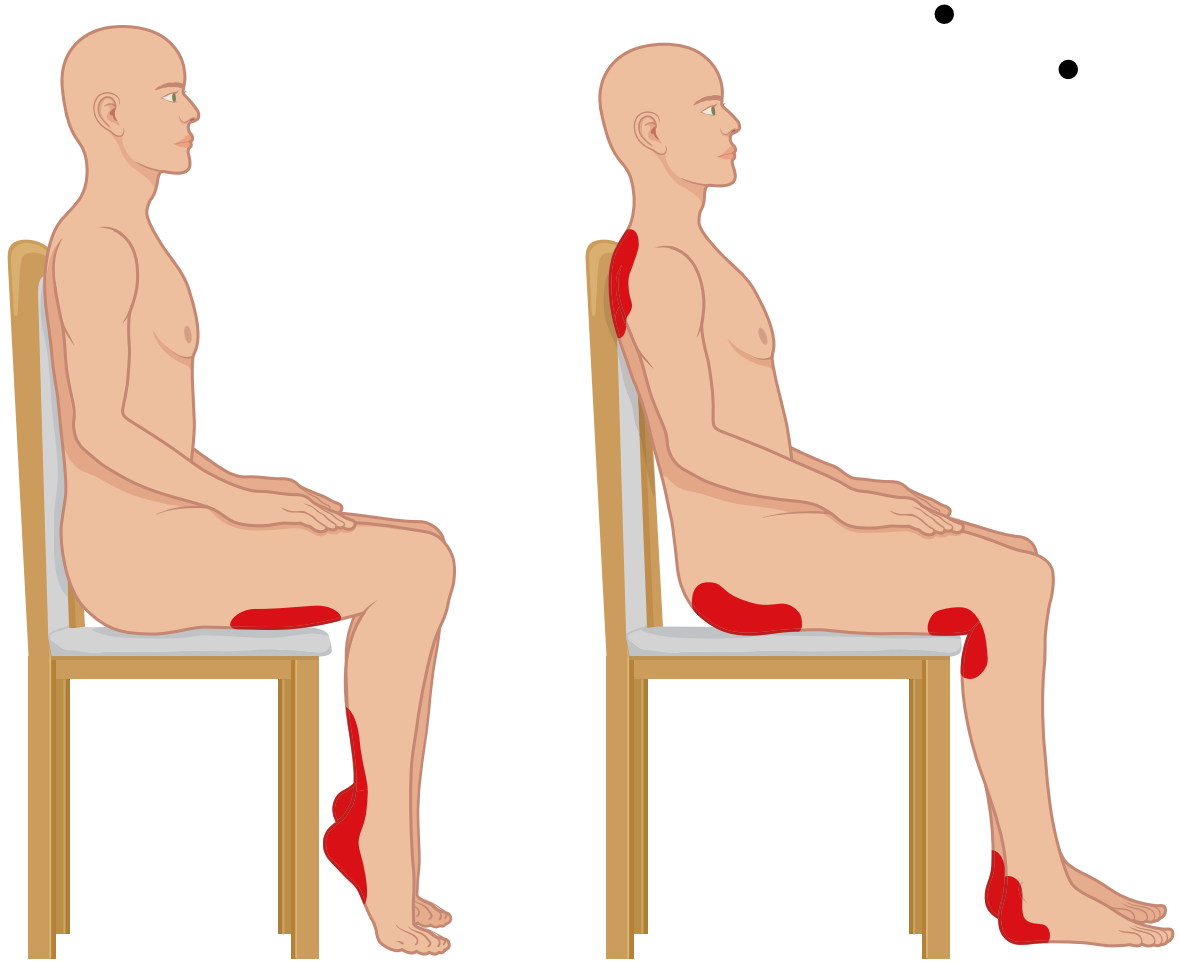
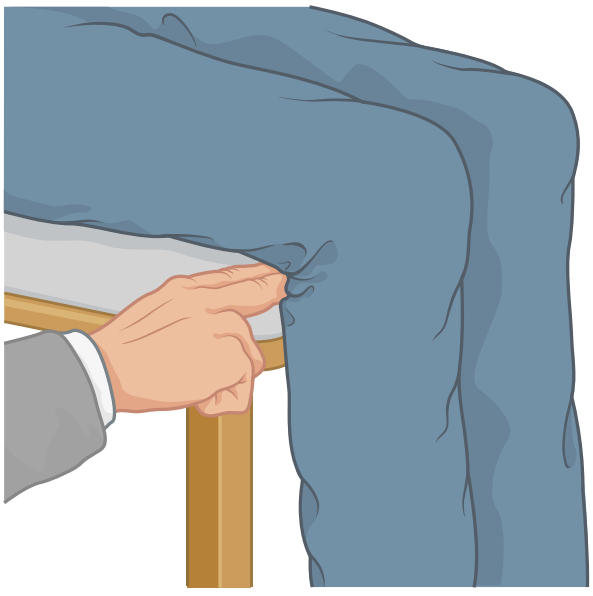


Figure 11: Seat depth clearance



Seating guidelines

What makes an ideal seating assessment?

Seating assessment is complex and requires a trained individual e.g. physiotherapist, occupational therapist or ergonomist who can carry out a comprehensive, evidence based and person centred approach[22,30], which should be documented in the person's medical or social care records. A key part of any seating assessment is the requirement to inform and educate the individual, their family/carers, and other health and social care workers about:

- Why the chair or cushion may be provided
- How to use, clean, and maintain this equipment
- The potential impact of their lifestyle on the prevention/management of pressure ulcers.

This information should be followed up in writing and include any course of action agreed with the person to manage potential risks if they differ with current best practice. The following features should be considered in combination with the health or social care professional's clinical judgement, although this is not definitive (Figure 12):

The person

- Past medical history
- Current health status (physical & mental)
- Pressure ulcer history/risk assessment
- Body size and proportions
- Ability to transfer/mobilise/pressure relieve
- Level of independence
- Nutrition
- Medication
- Continence
- Opinions, life style and preferences

The chair/cushion

- Type
- Size
- Hours to be spent in the chair
- Temperature and humidity when seated
- Interface Pressure Mapping
- Function of the chair
- Additional supports
- Material
- Durability

Seating assessment [13, 14, 16, 17, 18]

Carer

- Adjustability of the chair
- Manoeuvrability
- Easy to maintain and clean
- Ability to position person in the chair
- Opinion

Other

- Risk assessment: environment, person and carer
- What is the chair to be used for?
- Environmental aspects: size of the room, doorway width, room temperature
- Motivation to use the chair
- Occupations
- Aesthetics (look of the chair)
- Cost

Seating guidelines

Who might be involved in the seating assessment?

Occupational therapists and physiotherapists are often the health and social care professional who will carry out a seating assessment and prescribe equipment. This is often in collaboration with other members of the interprofessional team such as the: Tissue Viability Nurse, Doctor, Clinical/Rehabilitation Engineers and Assistants and Care Equipment Coordinators[24,32].

What interventions can I expect after a seating assessment?

After a seating assessment is completed, the health or social care professional may recommend a piece of equipment. Given the wide range of chairs, wheelchairs, and seat cushions available, as well as the wide range of physical conditions for which they may be prescribed, it is not possible to provide specific guidance upon which cushion or chair to provide for each individual. However, general guidance suggests that people with seating needs must have the ability to access advice and equipment from wheelchair or community services in a timely manner[30,33,34,35,36].

Adults who remain seated for longer periods of time need to have regular follow-up of their pressure-redistribution needs, which may lead to a change or replacement of equipment if necessary.

For the person to both accept and use the seating equipment there may need to be a trade-off between what the healthcare professional considers the ideal seating should be, and what is manageable for the individual's lifestyle, capabilities and personal preference[36]. This can sometimes involve careful negotiation as the preferences can differ to those of the health professional. A review of current research by Howard et al[37] on why people abandon assistive technologies found six main reasons or themes:

1. Design and function of the assistive technology lacked end user and clinician input in the design process and this meant the assistive technology was not easy to use, was too cumbersome or could not be used in certain environments
2. Information and awareness, in particular lack of it for the end user who would be using the equipment
3. Service Provision, that is the end user not being involved in choosing the equipment
4. Psychological barriers such as the assistive technologies are awkward, annoying or not appropriate for use
5. Support networks or family and friends are not encouraging, in the use of the assistive technology and provide only negative views
6. Societal barriers from others which creates a stigma about using the assistive technology for the end user

Figure 13 illustrates the differences in opinion between people who remain seated for long periods[36] and healthcare professionals on the top 4 necessary features pressure redistributing chairs and cushions should provide.

The findings, from conducting surveys with people who remain seated for long periods, showed that their priorities focus on the need for comfort, how the cushion or chair looks, the function of the cushion or chair and the cost. The results from an online survey and focus groups (n=3) of 181 health and care professionals reported a difference in their top 4 priorities which included the provision of postural support and function when sitting on the cushion or in the chair, comfort, ease of transfers on and off the cushion and ease of use, and professional opinion of the cushion or chair. Demonstrating that in order to prevent equipment abandonment discussions and considerations from the end user and their carer need to take place with the health or care professional[36,38,39].

Seating guidelines

Figure 13: The differences in opinion of the priority of necessary features of chairs and cushions between healthcare professions and people who remain seated for long periods of time.

Feature and priority	Adults who remain seated for long periods of time	Health and care professionals
Most important feature	Comfort	Provision of postural support and function
Second important feature	Aesthetics and how the chair looks e.g. fabric	Comfort
Third important feature	Function of the chair	Ease of transfers on and off the cushion/ chair and ease of use
Fourth important feature	Cost	Professional opinion of the cushion or chair

After an assessment, there may be referrals to other services such as a Tissue Viability Nurse, Engineer etc.

Cushion and static chair selection

There are many different types of pressure redistributing seating equipment available to help prevent and manage pressure ulcers such as:

- A single cushion to use on the chair
- An integrated cushion into a seating system
- A custom-made cushion.

There is limited evidence to demonstrate that one cushion or static chair is better than another and decisions about specific cushions are often based on individual opinions[40,41]. It is important to consider several factors in cushion prescription such as what the cushion is made of and how it performs. Health and care professionals that assess the properties of the cushion/chair consider the factors listed in figure 10. However particular attention is paid to reducing the pressure exerted on the areas at risk, adaptation to the user's body shape, managing temperature and humidity at the buttocks, and comfort[22,30,31,36,39,61]. There are advantages and disadvantages to consider with all forms of cushion.

Static cushions/chairs such as those made using foam, gel, air or water are made to decrease the risk of tissue damage by redistributing pressure at the bony points in the pelvic area of the seated individual. Table 3 provides a list of the most used materials used in cushions and chairs, which are currently commercially available in the United Kingdom[39,61].

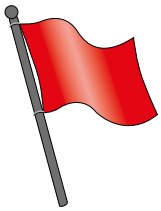
Seating guidelines

Table 3: Advantages and disadvantages of cushions

Cushion	Advantages	Disadvantages
Polyurethane foam cushions are made of chemical compounds and vary by thickness. The thicker the foam, the more hard wearing it is	• Relatively inexpensive • Soft and stable support surface • Some have bacterial control within the core of the cushion • Quickly warms up and retains heat • Sculpted or machine-profiled foam cushions maximise the contact area between the individual and the cushion • Easy to use	• Lower quality foam cushions may require replacement after 6-12 months' use • The cushion may only be suitable for people below a certain weight • Poor quality foams may degrade and collapse faster • Heat and moisture may build up between the cushion and the buttocks – hot damp skin and soft tissue may be at elevated risk of breakdown during prolonged sitting
Viscoelastic foam cushions are made from polyurethane foam with additional chemicals that increases its thickness and flexibility. They were originally designed for impact absorption. These cushions may be useful to consider in the case of people with short and long term mobility problems who experience pain (for example cancer or arthritis)	• Contours to buttocks so in order to increase the area in contact with the cushion so that it redistributes pressure • Warms up relatively quickly to enable the buttocks to sink into the cushion which helps to fix the pelvis in the seat • Stable seat support	• If stored before use in a cold environment can feel firm until the material warms up • Transfers for some people can be affected due to cushion contouring to the shape of the buttocks, making the surface uneven and people feeling stuck. • Once the cushions warms up it can become too warm for some
Gel cushions vary in the thickness of the gel used in their construction. Thicker gels are more solid and can be used on/in some foam cushions. Low thickness gels are more fluid	• Contour to the shape of the buttocks increasing the area in contact with the cushion so redistributing interface pressures • Conducts heat away from the skin surface so may feel cool to the user	• The movement of low thickness gels may be noticeable to the person and affect their seated balance and ability to transfer from the seat • Low thickness pure gel cushions will leak if punctured
Air filled cushions are cushions filled with air and are available in varying levels of thickness. They depend upon the amount of air flow into the cushion to be effective	• Lightweight and easy to move • Can provide postural support • Air circulation may lessen heat and moisture build-up • May include the function to selectively deflate air cells and offload vulnerable areas of the buttock	• Can feel unstable for some people • May be difficult to transfer from • Person/carer education required to maintain optimum air flow • Regular maintenance required to maintain correct operation • Can be punctured

Seating guidelines

Cushion	Advantages	Disadvantages
Dynamic seat cushions have a polyurethane/ viscoelastic foam base with air sac inserts that regularly inflate and deflate within the cushion every 10-12mins by the means of an attached pump	• The alternating inflation and deflation of the air sacs changes the pressure points of the pelvic area and stimulates circulation. The frequency and degree of this is automated • Easy to use as operation of the cushion is preset • Some are battery operated	• Some require electricity supply. • Batteries require charging • As cushion provides pressure relief, the end user may not be motivated to carry out other self-help repositioning techniques • Costly in comparison to static cushions. • People may feel unstable due to inflation and deflation of the cells. • Difficulty with transfers if person feels unstable
Watercell technology has water-filled sacs used with viscoelastic foam incorporated into the seat of a chair in order to contour to the shape of the buttocks	• Contours to buttocks so increasing the area in contact with the cushion so reducing pressure • Comfortable	• May leak if punctured • Takes time to warm up
3 dimensional spacer fabrics is a knitted fabric consisting of two separate knitted surfaces which are joined together back-to-back and kept apart by an inner layer of monofilament spacer yarns	• Lightweight and easy to move • Can be washed and tumble dried • Contour to buttocks increasing the area in contact with the cushion so reducing interface pressures. When multilayered, reduce peak pressures in vulnerable areas • Comfortable, may help disperse moisture and heat in the seated area	• New technology and limited evidence base



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The selection of a cushion should not be solely based on interface pressure measurements (IPM), other factors such as comfort, appearance, feel and look of the cushion, weight limit and portability of equipment, lifespan and carrying out seating adjustments with a specialist are equally important[25,54,61]. Pillows and additional cushions should not be placed on top of the specialist cushion as this will negate the pressure redistributing properties of the cushion and affect the seat height.

Seating guidelines

Cushion covers

The selection of an appropriate cushion cover can influence seating preference. Cushion covers should be made of a material that:

- Prevents 'hammocking' (the cover does not conform to the shape of the cushion when seated because it is too tightly fitted)
- Enables independent transfers if appropriate for the person
- Accommodates air exchange to minimise the temperature and moisture between the buttocks and the cushion, also referred to as 'Microclimate'[62,63]
- Is easy to clean
- Is removable to allow inspection of the cushion

Wheelchairs

People who have difficulties walking may be prescribed a wheelchair. As with all seating equipment, there are many different varieties of wheelchairs which are outside the scope of this document. However, prescription of such equipment should be based on individual assessment[64]. Like other seating, wheelchairs will often incorporate a cushion to provide pressure relief and require specialist input to optimise posture and support e.g. height of foot plates.

Performing pressure reliefs or weight shifts are a key part of pressure ulcer prevention in wheelchairs[65]. For further information regarding wheelchairs please see UK Posture and Mobility Group (www.pmguk.co.uk) and RESNA (www.resna.org) based in the USA. These two organisations are worldwide educators sharing knowledge and promoting best practice in wheeled mobility and seating.

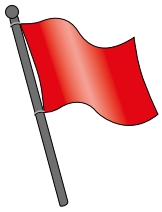
Tilt, recline, and elevating leg rests in wheelchairs and static seating

For those who are at risk of pressure ulcers developing, tilt-in-space, recline and elevating leg rests in chairs are sometimes useful in providing pressure redistribution[66,76]. In other chairs, the seat to back angle remains fixed as they are tilted backwards with the occupant remaining in the same seated posture. Figure 14 illustrates the advantages and disadvantages of tilt in space chairs. It is important to note that whilst this kind of chair can be advantageous for some it can be detrimental to others. For example, breathing can be improved or worsened with the use of tilt in space depending on the individual's circumstances. Therefore, it is important that a holistic assessment is made with a health and social care professional if considering this type of chair.

Figure 14: Advantages and Disadvantages of tilt in space chairs.

Advantages	• By tilting the position of the chair backwards by 15, 25 or 35 degrees combined with recline can reduce load and increase blood flow to the skin at the buttocks[43,44] • Increases trunk and head control • Improves function, for example, reaching • Improves visual orientation, speech, alertness, arousal, respiration and eating • Carer can carry out personal care, for example, changing incontinence pads[45]
Disadvantages	• May have a negative effect on breathing and promote muscle spasms for some wheelchair users • Difficulty with eating and drinking • The tilt-in-space wheelchair may be incompatible with the wheelchair users' environment, for example, the height may prevent the use of table and desks • The space required to safely turn and move the wheelchair/chair is increased due to the position of the footplates and push-handles when in its tilted position • Cost of equipment can be higher than other types of seating[45]

Seating guidelines



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What to consider when purchasing or renewing cushions and seating

There is evidence which demonstrates that pressure redistributing cushions and chairs may reduce the incidence of pressure ulcers. However, this is limited to which cushion or chair is most effective.

There are many considerations in ensuring prudent purchase of such specialised equipment. The first is to take a holistic approach which has been informed by the collection of data which includes: the seating assessment, the purpose of the seating/cushion for the end user (is the cushion or chair to be used for immersion, envelopment or stability). Can the product be purchased directly or is it bespoke equipment that includes postural support. What interventions are required when using the seating, what are the priorities of both clinician and patient, what type of cushion or chair and cushion cover is required, and socio-economic factors such as whether the cushion or chair is being NHS, Social Care or self-funded).

Once these initial considerations have been made clear, other factors have to be thought about prior to a decision on how to purchase or procure (if working in health and social care) the cushion or chair.

An important consideration is information about the supplier of the cushion or chair, and can the equipment be supplied to your local area or the person's home, is it within the finances/budget of the person or organisation purchasing it and what stages are involved in the supply chain from sourcing, ordering, delivering and supplying the equipment.

The next factor to consider is the brand of the equipment being purchased, what is the size and range available, does the supplier provide user instructions for ongoing maintenance of the cushion or chair. Are the instructions easy to read and follow, do the manufacturers provide information and if needed training on how to use the product correctly. It is important to consider if the instructions are suitable for all types of reading and learning abilities. Also does the product need to be turned or maintained regularly.

In some organisations you may also have to consider whether the prescribed cushion or chair is being classed as a medical device or intervention. This is important as medical devices must comply with British, European and International Standards and Legislation[77]. These standards provide methods of determining changes in the properties of seat cushions (how they deform under load) based on their age and use. They also reference how to test wear and tear, which can be useful to validate warranty claims and to provide information about product, life, and performance limitations. This helps us understand cushion features listed above but also those such as crib factor (ignition source) and flammability of the equipment. It is also important to document in the user's health or care records of who received written information and training on the use of equipment, cleaning instructions, maintenance and repair, replacement and disposal, length of warranty, and product failure or recall. Cushions and chairs classed as medical devices also require regular equipment checks, some require electrical tests, and annual audits or reviews. Any faults or failures should be reported to the Medicines and Healthcare products Regulatory Agency (MHRA) as an adverse incident, using their Yellow Card reporting system[78].

Seating guidelines

What self-help suggestions are there to assist in the prevention of pressure ulcers?

The NHS uses a five-step model based on a healthcare innovation from the USA[79], which ties together current best practice in pressure ulcer prevention and includes the following factors:

Assess Risk:

When you see your health or social care provider, they might use screening tools to check your skin health[17]. These tools help the health or care provider to understand any risk of pressure ulcers developing and they may discuss this with you. If necessary, they will involve other health and care team members too. They follow guidelines to keep you safe and may keep a record of how often they need to check your skin.

Surface

Selecting the appropriate seating equipment is crucial in a 24-hour posture and pressure management regimen. To ensure the surface functions optimally, it's essential to:

- Minimise the number of clothing layers between the pelvic region and the cushion surface
- Promptly remove moving any handling equipment such as slings from beneath the buttocks after transfers
- Prevent all medical and non-medical devices from becoming trapped under the buttocks, legs, back, or other seated areas e.g. mobile phones, catheters and straps
- Exercise caution when positioning incontinence pads and the seams of underwear
- Moreover, consider investing in pressure-reducing mattresses, cushions, and pads to evenly distribute pressure and mitigate the risk of developing pressure ulcers

Skin

Skin inspection, including an assessment of the person's baseline skin tone should be carried out regularly throughout the day and can be performed by using a mirror or asking others if assistance is needed[80]. Skin inspection should also take into consideration areas where medical equipment may be in contact with the skin too. Skin that is too moist or too dry can increase the risk of pressure ulcers. Health and social care professionals can advise people and carers on moisturisers for dry skin, and how to keep skin dry for those with incontinence or buttocks that easily become sweaty.

A validated tool has been developed to assist with classification of skin tones, so that during assessment the tone can be selected that most closely matches the adult's inside upper arm. This is to ensure that equitable level of assessment, early identification of any skin changes or issues can be made, documented, acted upon and monitored as should be in the delivery of routine care.

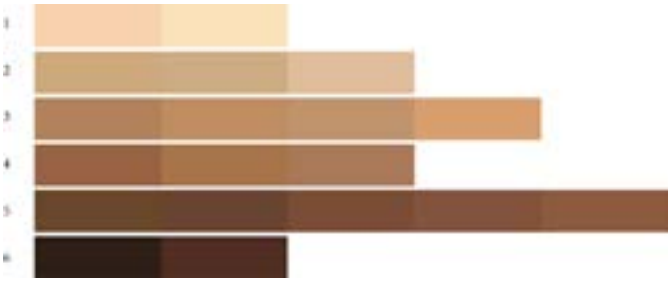


Figure 15. Skin tone tool (adapted from Ho and Robinson, 2015)[65]

Keep Moving

Guidance on repositioning (pressure relief and weight shifting) when seated must be provided to both carers and individuals with acute or long-term mobility issues. This intentional movement can be conducted in three primary ways (see Figure 16 and 17)[66]. Guidelines recommend performing pressure relief every 30 minutes, with each session lasting 30 seconds for those capable of independent repositioning[66]. For individuals requiring assistance, repositioning aid should be administered as directed by a health and social care professional. According to NICE guidelines, individuals at risk of pressure ulcers should change their position frequently and at least every 6 hours, those at high risk should change their position frequently and at least every 4 hours and those with existing pressure ulcers should have their seating needs considered especially if sitting for long periods[56]. In such cases, it may be advisable to lie on the bed briefly to alleviate pressure on vulnerable areas. Numerous studies have been conducted to examine the influence of repositioning frequencies on pressure ulcer development in a variety of settings and are discussed in the EPUAP/NPIAP/PPPIA[24] Guidelines. The recommendations are that health and social care professionals should '..determine repositioning frequency with consideration to the individual's:

Seating guidelines

- Skin and tissue tolerance
- General medical condition
- Overall treatment objectives
- Comfort and pain

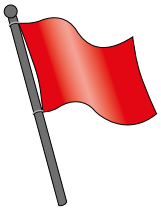
Recent research has also suggested that self-reported repositioning behaviours are not always reliable and for some people and other interventions such as training, pressure measurement devices, alarms and verbal prompts are needed[82,83,84,85,86]. A useful process is for health and social care professionals to undertake individualised training that incorporates both a "feasible and realistic" repositioning (pressure relief and weight shift) routine. This would include an examination of day-to-day activity that already has leaning and reaching that promote activity but also redistribute loading to the buttocks and sacrum. This would also include taking a person who has a tilt and recline/tilt in-space chair, through the full ranges of tilt, including seat pan tilt, to reduce fear of falling out from being tilted in the chair [82,88].

Figure 16: Sideways lean
www.youtube.com/watch?v=FMudH2gyJi8

When the individual raises one buttock at a time by leaning or rolling sideways, and this movement usually relies upon the use of armrests for support. This intentional movement requires a degree of trunk control in order to regain a stable seated posture.

Figure 17: Tilt forward and Full Frontward Lean https://www.youtube.com/watch?v=BdzcYiI-16g

When the individual leans forward with their chest moving towards their thigh whilst their buttocks remain in contact with the seat. Although this movement does not take the buttocks away from the seat, it can alleviate pressure underneath the bony bit of the buttocks.



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Standing frames and wheelchair standing devices

It is commonly known that standing should be a part of the twenty-four-hour pressure management routine of people with short or long-term mobility problems. Standing not only offers pressure relief but improved functional reach, independence, vital organ capacity, circulation and passive range of motion. Standing reduces the occurrence of water infections, abnormal muscle tone, skeletal deformities and enhances wellbeing[71].

Seating guidelines

Incontinence

It is crucial for individuals experiencing incontinence to consult a health or social care professional for advice on the suitability of creams, pads, pants, and other related equipment. Incontinence heightens the risk of skin breakdown around areas such as the buttocks, top of the buttock crease, and tailbone. Such breakdown can manifest as either a moisture lesion or a pressure ulcer, necessitating professional healthcare guidance[24,88].

Nutrition/Hydration

Maintaining healthy skin requires a well-balanced diet and adequate hydration. This includes consuming a diverse range of foods and fluids in appropriate proportions throughout the day. Further information can be found in the NHS Eatwell guide[89]. If individuals encounter challenges with eating and drinking, guidance can be sought from various professionals, including doctors, dentists, dietitians, or speech therapists.

Giving Information:

In a study by Gourlan et al.[90] who explored perceptions and beliefs of people with spinal cord injury of what pressure ulcers meant to them from conducting questionnaires discovered six categories:

1. Identifying what might become problematic which includes discussing what the person's risk of pressure ulcers is, their general knowledge of pressure ulcer development and the factors that contribute to their development at a personal level

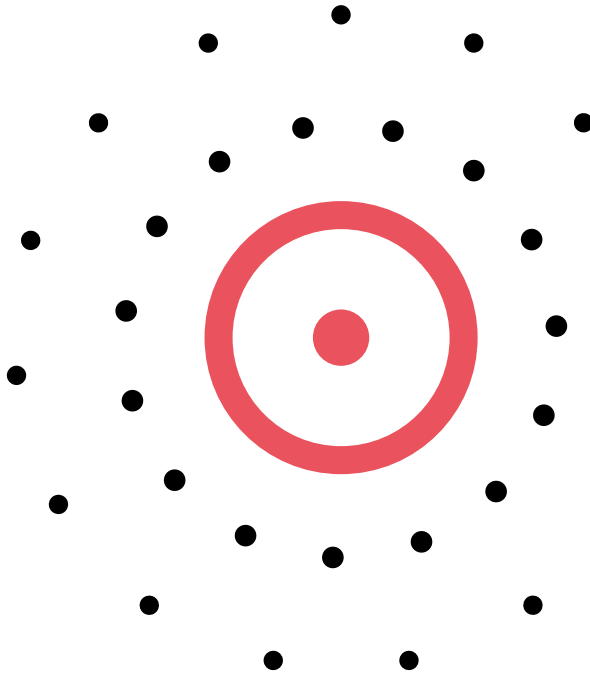
2. Daily preventive actions that can be taken to prevent pressure ulcers which can include involvement of a caregiver (third party, family or friend) and their level of knowledge and skills in skin care and hygiene, repositioning, mobility and access to and correct use of equipment

3. Detecting the early signs which incorporate the necessary skills and abilities to screen and visually inspect the skin for pressure ulcers and having this checked by a third party

4. Managing the early signs was highlighted as being able to describe the risk factors that led to development of the pressure ulcer/skin issue and then actioning evidence based prevention and management interventions within a reasoned and structured plan either personally or with the assistance of others

5. Need for care encompasses the need for third party support in the management of a pressure ulcer that has developed and the time needed until healing is achieved. This was described by adults with SCI as being a burden and feeling powerless with the evolution of the pressure ulcer

6. Experience with pressure ulcer and being bedridden was described as the stress and anxiety that having a pressure ulcer can cause. This often leads to mood changes and depression from having to withdraw from social activities because of repositioning interventions and increasing periods of time spent in bed. Family and social activities are affected which are enjoyable parts of life. The study also found that some people are aware of the medical risks of developing a pressure ulcer such as malnutrition and infection. However, this is not as frequently discussed as the psychological and social impact



Seating guidelines

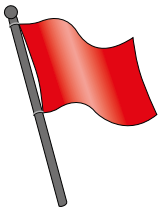
From these findings it is important to ensure clear channels of communication between the person who remains seated for long periods of time and those involved in providing care and support. It is important to develop knowledge and understanding of pressure ulcers and how they develop and are managed. A relationship should be one built on shared decision making and trust where the asking of questions is day to day practice. This will ensure that the person who remains seated for long periods and their family or carer fully contribute to shared goals, understands how to use equipment, treatments or interventions recommended by the health or care team, and ask for further explanation if needed. If at any time health concerns aren't being addressed, it is important that everyone is encouraged to speak up and request further evaluation. Taking an active role in preventing pressure ulcers by following the health or care team's advice and suggestions is important. This also includes understanding that resources may sometimes be limited, but not hesitating to ask for additional support or resources if needed. It's important that everyone is aware of policies in place to protect adults who remain seated for long periods of time and to encourage them to speak up if ever they feel unsafe or uncomfortable. One method is to keep personal track of any medical information to ensure its accurately documented in medical or care records for all involved in care provided. If medical photographs are necessary, ensure that consent is given both verbal and written before any images are taken.

Sickness

Another important consideration is to remain vigilant when individuals experience general illness, as this heightens their vulnerability to developing pressure ulcers[36]. Common sickness indicators include:

- Vomiting
- Infections (such as chest, urinary tract, or throat infections)
- Influenza
- Alterations in bowel activity (e.g., diarrhoea, constipation)
- Heightened alcohol consumption
- Depressive episodes
- Disruptions in routine (e.g., long journeys, holidays)
- Life changes within the family
- Degeneration in long-term health conditions
- Experience of pain

These factors warrant attention as they can significantly impact an individual's susceptibility to pressure ulcers.



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Some people are unable to say when they are not feeling well and the only way to recognise a change is through factors such as discomfort, changes in skin colour (paleness), breathing rate, heart rate, body temperature and non-verbal cues (changes in body movement, facial expression and posture) may be present [91].

Key seating outcomes for the long-term seated individual

For people with short or long-term mobility issues the assessment and prescription of seating equipment should take into account the persons and carers opinions and address the following outcome measures:

- Comfort and postural stability[33,34,36,38,39]
- Pressure redistribution
- Physiological abilities e.g. breathing, swallowing, digestion[92,93,94]
- Participation in occupations and activities such as hobbies and daily living tasks[92,93,94]
- Impact on the person's quality of life[95]
- Communication

Due to the changing needs and expectations of people with long-term mobility issues; a routine review of their seating needs should be completed by a health or social professional in accordance with best practice. The most recent evidence suggests between three months and three years depending on individual factors such as health status, changing posture and

Seating guidelines

weight loss or gain[25,33,34,35,36,95,96]. However, this should be sooner if a person develops pressure damage, a routine review can be requested by a carer or person directly, without involving a healthcare professional. More recently smart digital devices such as pressure mapping cushions and digitally worn devices using sensors have been found to be of use to assist in both monitoring and reminding people to perform repositioning movements when seated[97,98]. This assistive technology also is shown to be of assistance with further education on prevention strategies.

Standards of how to test cushions and seating

Cushions that are purchased to provide pressure support should comply with standards. These represent a series of tests which ensure the cushion is safe and effective for use[99]. One of the most common standards is published by the International Organization for Standardization (ISO). ISO hosts a panel of experts from industry, healthcare and academia to agree on a common set of tests by which cushions and seating systems can be tested (e.g. ISO 16840[100]). There are several parts to the seating standards which cover tests of immersion properties, effects of repetitive loading, stability characteristics, dissipation of moisture (perspiration) and fire retardancy. These standards are often cited on the supporting documents for the cushion alongside a CE mark.

Pressure Mapping is one of the tests applied to characterise a cushion. The use of pressure mapping is common in some clinical areas, such as specialist seating clinics. It is also used within standard bench testing to provide an indication of pressure distribution. Commercial pressure mapping systems typically provide a visual colour map of the pressure values across a cushion, which help to identify contact areas, different peak pressures and different average pressures in specific regions e.g. under the ischial tuberosities. This can provide insightful information for the clinical decision-making process, depending on the individual's needs[101].

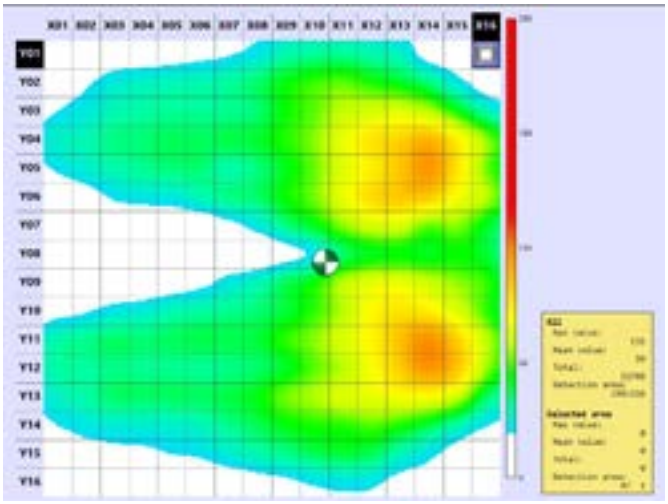

Figure 18: Pressure mapping

In practice settings there are a number of checks you can perform to make sure the cushion remains safe and effective for use. For example, you can compress the cushion with your hand, checking for bottoming out, particularly in air cushion devices which require inflation. You can also check for water/fluid penetration by removing the cover and assessing any staining in the inner material. Penetration may also cause a change in odour which can be checked. To support infection prevention and cleanliness of the cushion, regularly assess zips and seams in the cushion or seating device, and replace if broken. If you feel the cushion has lost some of its supportive or immersive properties, you may also want to perform pressure mapping, helping to understand whether the cushion still provides the pressure redistribution that is appropriate for the individual. This could be performed as part of a multidisciplinary assessment.

Seating guidelines

Useful resources

Society of Tissue Viability

A member-led charity that uses the power of collaborative thinking and action to solve wound and skin challenges

https://societyoftissueviability.org/

NHS Choices

A NHS website that provides a complete health information service with multiple articles, videos and tools, to help people make the best choices about their health and lifestyle.

http://www.nhs.uk/pages/home.aspx

Legs Matter

This website is provided by a coalition for working together to increase awareness, understanding and prevent harm for lower leg and foot conditions.

https://legsmatter.org/

National Wound Care Strategy Programme

The National Wound Care Strategy Programme (NWCSP) has developed from several previous initiatives which addressed the issue of sub-optimal wound care. The programme is commissioned by NHS England to improve care for people with wounds.

Information is provided on the website to help health and care professionals prevent pressure damage and promote healing.

https://www.nationalwoundcarestrategy.net/pressure-ulcer/

NICE Guidelines for the public (cg179)

Internet advice from the National Institute of Health and Care Excellence on the care and support that should be offered to people who use health and care services in regards to pressure ulcers.

https://www.nice.org.uk/guidance/cg179/

Public Health England

Internet advice from Public Health England on the care and support that should be offered to people who use health and care services in regards to pressure ulcers.

https://www.gov.uk/government/organisations/public-health-england

We have also included the React to Risk assessment questionnaire.

Risk factor questions	Tick
Are you over 65?	
Do you have restricted mobility?	
Do you have problems with managing continence?	
Is your skin dry, clammy, or has discolouration, blisters, heat, swelling, and hardness?	
Are you above or below average weight?	
Has your appetite changed or have you lost weight?	
Are you anaemic?	
Do you have diabetes?	
Have you recently had major surgery?	
Do you smoke?	
Do you have organ failure?	

If you have answered yes to 3 or more or the questions asked above, you MAY be at risk of pressure ulcers developing. For a complete test consult a health or care professional.

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Appendices

1. Methodology
2. Glossary of what words mean

1. Methodology

In order to conduct a thorough search of the literature to inform the update of the seating guidelines it was agreed to set a research question and objectives.

Question

What do we already know about the prevention and management of pressure ulcers in adults who remain seated for long periods of time?

Objectives

The objectives were:

- To update and revise the 2018 TVS Seating Guidelines.
- To report on current evidence-based practice within the prevention and management of pressure ulcers in adults who remain seated for long periods of time in both health and social care settings.
- To examine different types of pressure redistributing cushions, chairs and interventions that relate to the prevention/management of pressure ulcers in adults who sit for long periods of time.

Literature search

A comprehensive literature search was conducted in December 2023 and repeated in April 2024. The Population Concept and Context framework was used to frame the search.

Population	Adults who remain seated for long periods of time
	Concept Interventions which include:
	Seated position.
	Seating Assessment.
	Use of pressure redistributing cushions and/or chairs.
	Use of tilt, recline and repositioning schedules.
	Self-management activities/interventions.
Context	Prevention and/or management of pressure ulcers.

The PCC framework assisted in development of keywords used in the search and these included: pressure ulcer/ OR bedsore* OR ischial sore* AND decubitus OR pressure sore* OR pressure induced soft tissue damage OR skin break AND (posture/ OR sit* OR seat* OR immobile* OR wheel chair dependent OR sensory impairment OR spinal injury/) AND (gel OR foam OR air OR oil-based OR oil based OR seat) AND cushion. The search was limited to August 2011- April 2024. No other filters were applied. The following databases CINAHL, Pubmed, Cochrane, Google Scholar, were used. Grey literature and hand searching was also conducted, including organisations such as EWMA and EPUAP.

Glossary

2. Glossary of what words mean

Word used by health and care professionals	Lay Term	Meaning
Pressure ulcer/pressure injury/decubitus ulcer	Pressure sore	An injury that breaks down the skin and underlying tissue due to pressure and/or shear forces
Ischial tuberosity	Bony bit of the buttock	Bony protrusion which takes the body's weight during sitting
Greater trochanter	Widest part of the thigh when seated	Greater trochanter is the head of the femur and can be located on palpation at the lateral aspect of the thigh
Sacrum	Area at the top of the buttock crease	The sacrum is a large wedge shaped vertebra at the inferior end of the spine.
Coccyx	Tailbone	A small, triangular bone located at the bottom of the spine
Popliteal fossa	Back of the knee	Shallow depression located at the back of the knee joint
Bony prominences	Areas where bones are close to the surface	Areas that are under the most pressure and greatest risk for developing pressure ulcers.
Scapula	Shoulder blade	Two flat, triangular bones, each forming the back part of a shoulder
Occiput	Back of the head	Back part of the head or skull
Medial aspect of knees	Between the knees	Area between the medial epicondyle of the femur and the anteriomedial aspect of the tibia
Short term mobility issue	Short term mobility issue	People who, due to ill health, injury or surgery are unable to mobilise on a temporary basis
Long term mobility issue	Long term mobility issue	People who, due to disability, ill health, injury or surgery are unable to mobilise on a long term basis
Cognitive ability (capacity)	Thinking and reasoning	The ability to learn, remember, problem-solve, and pay attention
Informed decision making	Making a decision, having considered all the relevant information	A decision by a person based on choice, which requires the decision to be voluntary and that the person has the capacity for choice
Disability problems/ challenges/issues	Disability issues	A condition or function judged to be significantly impaired relative to the usual standard of an individual or group

Glossary

Social functioning	Participation in conversation and social activities	Ability to engage in conversation and social activities whilst seated
Adults who remain seated for extended periods of time	Adults who remain seated for extended periods of time	People with a long term mobility issue or disability who are unable to independently mobilise
Patient/service user/client/ people	People	Any person who has a mobility issue and requires access to health and social care professionals
Optimal seated posture	Best possible seated posture	Sit in a position where the least strain is placed on supporting muscles and ligaments during movement and activities.
Interface pressures	Interface pressures	The force per unit area that acts vertically between the body and a support surface
Aesthetics	A pleasing appearance that looks and feels nice	The appearance of the equipment used in seating
Occupations	Things that people do	Activities that people do on a daily basis such as work, leisure, activities of daily living
Scoliosis	Curvature of the spine	Abnormal, sideways curvature of the spine which can be 's' or 'c' shaped
Kyphosis	Curvature of the spine	Excessive outward curvature of the spine, causing hunching of the back.
Lordosis	Curvature of the spine	Excessive inward curvature of the spine
Full frontward lean	Full frontward lean	To lean forward form a sitting position until the chest comes to rest on the knees
Intermediate frontward lean	Tilt forward	To lean forward from a sitting position in order to offload pressure from the ischial tuberosities
Sideways lean	Sideways lean	Lean sideways from a sitting position in order to offload pressure form one buttock
Physiological changes	Physiological changes	Change in a person's blood pressure, pulse, temperature, respiration in response to illness or pain
Static seat/chair	A chair	A specialist piece of equipment used in the 24 hour posture and pressure management of an individual who has short or long term mobility issues

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