

Seating and cushions for preventing pressure damage among patients in the community

KEY WORDS

- ▶ Pressure
- ▶ Cushion
- ▶ Upholstery

Prevention of pressure damage remains a hot topic that is never out of headlines. While the cushion is one of many tools that can support patients in an armchair or sofa, a number of issues surround its use. As clinicians, we want the use of equipment such as cushions to be supported by plentiful research and clinical evidence. However, both clinicians and manufacturers often appear to neglect the cushion in comparison with the mattress; this is particularly the case as people use cushions in a different way to mattresses. This article highlights current limitations and assessment observations regarding pressure damage prevention and posture correction with cushions.

Seating is important for preventing pressure ulcers (PU) but sadly it is often neglected. Many health professionals focus on beds and mattresses for preventing PUs, forgetting the chair or sofa, despite many patients sitting in them all day. Within the community, there is no such thing as a standard piece of furniture. This can make it difficult to prescribe cushions for reducing pressure or correcting posture.

While the Tissue Viability Society (TVS) (2013) discussed seating in hospitals, this article discusses seating in the very different context of the community. This article highlights the current limitations to preventing pressure damage or correcting posture in community-dwelling patients with their own household chair or sofa. The author also discusses a number of observations for assessing clinical need when visiting patients. These observations include static sitting and the risk of pressure damage, the types of cushions available, and the level of clinical research by manufacturers into chairs or sofas compared with research into mattresses.

PATHOPHYSIOLOGY

Compared with sitting in a chair, lying in bed provides greater immersion into the mattress. This immersion increases the surface area of the patient in contact with the mattress, distributing their body weight over a larger area and reducing the risk of PUs (Clark, 2011). Thus sitting for prolonged

periods of time increases interface pressures, which may increase the risk of pressure damage (Gefen, 2007). The weight of a seated individual against their chair or sofa compresses soft tissue, which obstructs blood flow. When this compression is combined with limited movement, poor sensation, malnutrition and increased age, it may lead to pressure damage to the individual's ischial tuberosities, buttocks and sacrum (Mak et al, 2010).

The risks make correct sitting important. However, correct sitting also involves not impeding the patient's mobility or ability to carry out their daily activities (TVS, 2013). The incorrect seated posture is one that prevents an individual from achieving their optimal occupational performance.

REPOSITIONING

One of the most effective methods for preventing skin damage is regular repositioning (Sprigle and Sonenblum, 2011). Healthy, independent individuals can sit for lengthy periods without developing pressure damage as they make more seated postural movements (National Pressure Ulcer Advisory Panel [NPUAP], 2007); vulnerable, immobile people cannot do this. The NPUAP (2014) suggested minimising seating time or considering periods of bed rest for immobile people. However, they acknowledged that if reducing the hazards of immobility, facilitating eating and breathing, and promoting rehabilitation make sitting in a chair necessary for an individual, sitting should be

LESLEY BERRY
Nurse Advisor, Sheffield
Community Equipment Loan
Service, Sheffield

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limited to periods of 60 minutes or less, three times a day. The American Chiropractic Association (ACA, 2014) also advised against sitting in the same position for long periods yet did not mention a particular length of time; neither did it take into account physical disabilities or care packages.

Within the community, patients who are dependent on carers provided by the local authority are given a set, timed package, which might only include up to four visits a day with or without night calls. This results in limited positional changes and inappropriate dependency on equipment. Stockton and Rithalia (2008) recommended that movement should occur every 15 minutes, while the National Institute for Health and Care Excellence (NICE, 2005) discussed not sitting for longer than 2 hours without movement.

Movement may include getting out of the chair to use the toilet or to get something. Equally, pressure-relieving movement may involve carers hoisting patients or, when this is not practical, individuals may be taught how to alter their centre of gravity by leaning or performing push-ups to reduce the duration and magnitude of pressure before they are repositioned. Repositioning requires discipline and commitment and should be undertaken as an activity in itself, distinct from other daily routines.

THE IDEAL SITTING POSITION

To enable patients to sit in the ideal position, the clinician needs to consider the patient’s postural alignment, distribution of weight, balance and stability. The ACA (2014) suggested that correct posture helps to keep our bones and joints in their

correct alignment and, by decreasing the abnormal wearing of joint surfaces, could reduce the extent of degenerative arthritis and joint pain.

Mamau (2013) suggested the ideal sitting position should consist of the patient’s back being erect and against the back of the chair, thighs parallel to the floor, knees comfortably parted to prevent rubbing, and arms horizontal and supported by the arms of the chair. This position distributes weight evenly over the available body surface area. Slouching can cause shearing and friction, and places undue pressure on the sacrum and coccyx. Feet should be kept flat on the floor to protect the heels from pressure and to distribute the weight of the legs over the largest available surface area (unless a different care plan is required, e.g. for oedema). Chair arms are also important, as they can help a patient to change position, or stand to relieve pressure if the patient has standing ability.

ISSUES AROUND DOMESTIC SEATING

Several observations must be taken into account when looking at the seated patient. While some of these concerns can be corrected, this will be difficult in other situations due to the furniture being the patient’s property.

If seating is too high (including when a pressure cushion has been prescribed), the patient may slide forward to place their feet on the floor; this results in sacral sitting (*Figure 1*). Alternatively, the patient may remain where they have been placed, potentially resulting in damage to the back of the knees due to increased pressure from having their feet suspended, or discomfort from pressure on the heels if feet are against the chair or unsupported. Some patients who need a relatively high chair or sofa, for example after hip or knee surgery, find getting out of a higher chair easier due to not having to over-flex their joints; however, the advice would still remain for the seating not to be too high.

If seating is too low (*Figure 1*), patients will bear all of their weight through their buttocks, ischial tuberosities or heels, increasing pressure through these areas. This would equally depend on how a patient sits or is positioned, as sacral pressure may also become a concern for some patients. Getting out of their chair may prove difficult for some patients, reducing their independence and increasing their time spent sitting.

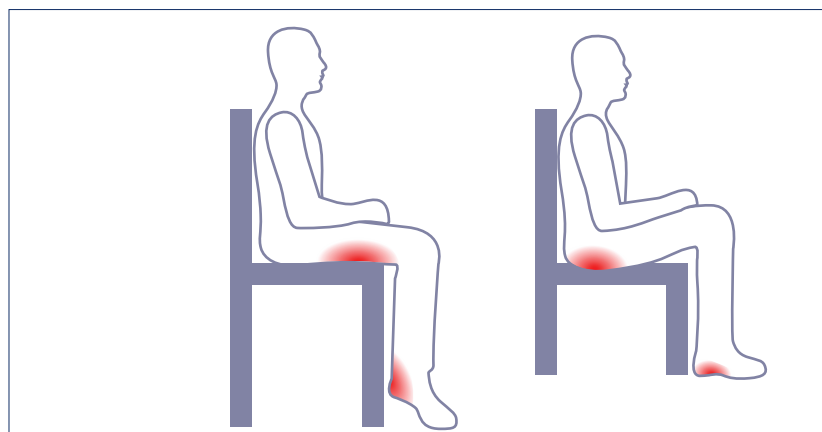


Figure 1. Seat too high or too low (TVS, 2013).

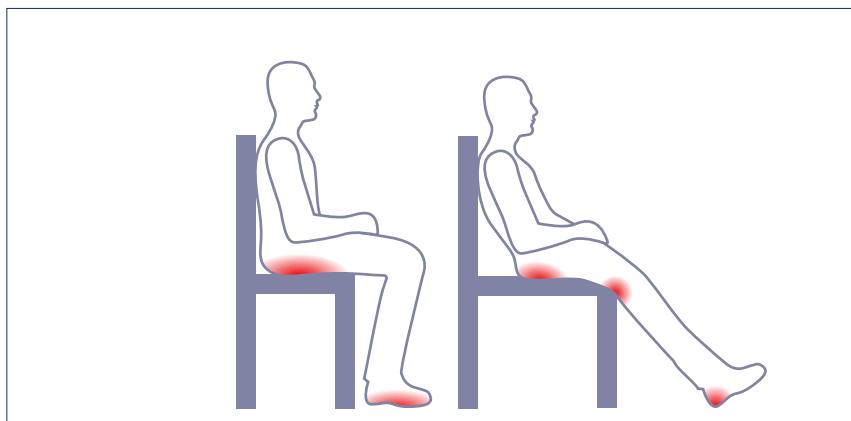


Figure 2. Seat is too short or too long (TVS, 2013).

If the chair is too short (*Figure 2*), pressure will be distributed over the patient's thighs, buttocks, ischial tuberosities and feet due to the reduced support. Shearing can be a concern with a chair that is short, and the patient is at risk of slipping to the edge of the chair, or off it and onto the floor.

If the seat is too long (*Figure 2*), it is likely that the patient will deliberately slide forward to bend their knees and place their feet on the floor. This raises the risk of shear damage to the sacral or buttock region and behind the knees or upper leg. Pressure will then be on the sacral region due to the shift of pressure from the ischial tuberosities; equally, isolated areas of the spinal column will be at risk as they have little subcutaneous fat. The heels will also be vulnerable due to the patient's inability to bend their knees, resulting in pressure concentrating over the calcaneal tuberosities, which are relatively wide for their skin surface area and have little subcutaneous fat (Gray, 2004).

If the seating environment is too wide (*Figure 3*), the patient will lean, resulting in pressure on the elbow and to all the pressure points on that side due to the shift of weight. If posture is already an issue, a chair will be of no benefit.

Seats that are too narrow (*Figure 3*) raise the potential for pressure damage to the hips and/or the thighs. Narrow seats may also make transfers difficult due to the tightness of getting out of the chair and making it a struggle for carers to insert or remove hoisting slings. Ideally, there should be 2.5 cm clearance between the hips and the sides of the chair (TVS, 2013). Equally, the seat should be wide enough to accommodate a user's hips and

clothing, and comfortably allow them to use the armrests (Openshaw and Taylor, 2006).

Tissue tolerance may be further compromised by a number of other conditions. These include: altered circulation (arterial or vascular disease); neuropathy; oedema, which adds the weight of the extra fluid; absence of sebaceous glands, resulting in a lack of lubrication; and increased levels of shear and friction (McGinnis and Stubbs, 2011).

When a person sits (if clinically appropriate) with their feet on the floor, the thickened dermis on the sole acts as a hydraulic absorption system that protects the heel from pressure (McGinnis and Stubbs, 2011). Patients who use a footstool are not using the soles of their feet as pressure absorbers, and may demonstrate skin damage through shear forces and pressure to the sacral and spinal areas. Users of footstools may also experience damage to either the calcaneal tuberosities or Achilles regions of their feet, depending on where the edge of the footstool is and the stool's material.

Armrests help relieve neck, shoulder and back stress. Armrests can provide a good surface area for the arms in contact with them to minimise pressure (Openshaw and Taylor, 2006).

Collins (2001) described the ideal weight distribution for a seated patient as 75% on their buttocks and thighs, 19% on their feet, 4% resting against their back and 2% on their arms. To date, no one has questioned this. Openshaw and Taylor (2006) state that while the correct seated posture is constantly debated between ergonomic professionals, patients should have 90°–90°–90° angles at the elbow, hip and knee joints. A good seated posture is one that is comfortable and does not put stress or strain on the patient's buttocks, back or arm muscles, and allows the patient's feet to be on the floor.

The most common anthropometric measurements (Openshaw and Taylor, 2006) for the seated position are: 42.9–51.8 cm in length for females and 44.9–53.6 cm for males; a popliteal height (floor to behind knee) of 36.45–43.7 cm for females and 40.5–48.4 cm for males; and the seat width recommendation is 35–43.7 cm for females and 33.8–41.8 cm for males. Having such a range of measurements makes manufacturing a chair or sofa to fit everybody impossible for companies; therefore, social furniture measurements are generic. The

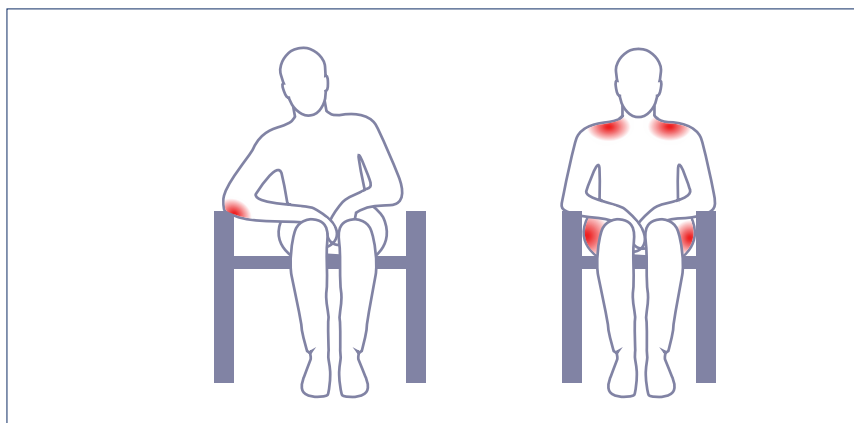


Figure 3. Seat too wide or too narrow (TVS, 2013).

problem occurs when a patient is above or below the most common measurements, and this results in the need for made-to-measure or specialist seating.

SPECIALIST SEATING

Chairs or sofas are designed for social sitting. Individuals or family often choose furniture for its appearance, comfort, and cost; some individuals will not consider a seat's size or its ability to support posture or reduce pressure. Neither shops nor manufacturers generally enable seats purchased from them to be altered before delivery unless specialised seating is obtained through the NHS. Specialist seating (not to be confused with specialist wheelchairs) is occasionally considered by specialist nurses, physiotherapists or occupational therapists.

A variety of specialist seats are available but all require individual assessments and are made to measure. All such chairs include a variety of methods (e.g. lateral supports or shaped backs) to support a person with spinal curvatures, contracted limbs, reduced core stability, uncontrolled leaning, skin damage or other concerns that generic furniture or pressure-reducing cushions could not rectify. Another important feature includes tilting, which increases support by changing the seat's orientation to enable carers to change the patient's centre of gravity and alter the point of pressure.

The arms of specialist chairs are generally wider, which will support better posture, and the width of the seat will be measured to fit the patient. All specialist chairs will also have integrated pressure-reducing cushions. Despite the advantages of such

specialist seating, these chairs can cost around £2,000–4,000 (Abbey Healthcare, 2014). NPUAP (2014) suggested consulting a seating specialist to prescribe an appropriate cushion, or discussing positioning techniques to avoid or minimise pressure ulcers.

LITERATURE SEARCH: PRESSURE CUSHIONS

The author performed a literature search of databases within Athens using the terms 'cushion' and 'pressure ulcer and cushion' to find what evidence is available to support clinicians. The majority of publications retrieved had studied cushions and pressure care relating to patients in wheelchairs or those with spinal cord injuries. A similar result was found by the TVS (2013), who conducted a literature search in 2008 and 2009 but found very few clinical studies upon which recommendations could be based.

The author performed a further search using the words 'pressure mattress' in CINAHL, and this resulted in the retrieval of 297 papers in comparison with the 'pressure cushion' search, which only retrieved 121 papers. A search in OVID retrieved 48 papers for the 'pressure mattress' and only 8 for the 'pressure cushion'.

THE USE OF CUSHIONS

Equipment such as the manufactured pressure cushion can be used to reduce pressure. However, Stockton and Rithalia (2008) suggested the overall pressures exerted over bony prominences when sitting on a cushion were unlikely to be low enough to maintain tissue perfusion without additional positional changes. Clark (2011) agreed that the degree of pressure will be lower with cushions but, unless the patient is repositioned, the pressure may remain constant and may still be sufficient to occlude circulation to the tissue.

THE TYPES OF CUSHIONS AVAILABLE

Selecting a cushion is a complex process of: assessing comfort and the patient's ability to assist or correct posture; reducing the concentration of pressure; assessing function and safety.

Cushions fall into two broad categories: those that reduce pressure and those that relieve

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pressure. Cushions that reduce pressure achieve this by increasing the surface area, encouraging patients to mould into its material. Cushions that relieve pressure achieve this by reducing the peak pressures, thus lowering the perfusion within the skin when the patient is sat on a pressure cushion. Another type of cushion uses small cells and an electrically-powered pump to relieve pressure.

The provision of a cushion should not be based upon the outcome of a PU risk assessment tool, as these tools are not designed to identify risk for those who sit for long periods (Wall and Colley, 2005). Equally, interface pressure mapping should also not be used to dictate cushion preference. Crawford et al (2005) suggested that looking at the distribution of pressure on the computer screen may aid cushion selection; however, interpreting the data can be difficult, and interface monitoring may not be available in some areas.

Gil-Aguda et al (2009) compared and analysed many variables related to cushion contact pressure, but reported no clear findings regarding the best material for seat cushions. As part of the Cochrane reports, Cullum et al (2004) and McInnes et al (2008) both agreed that very little evidence existed to suggest one cushion was any better than another. They suggested that clinicians often had to rely on their opinions regarding which cushion was the best rather than clinical evidence.

Hollington and Hillman (2013) suggested a cushion's pressure-relieving abilities are governed by three factors: the materials used, its construction or design, and the fit of the cushion to the patient. However, other factors are also considered within the nurse advisory service, including the clinical evidence, fire retardancy, infection control and cost. The main materials used in cushion construction are foam, viscoelastic foam, gel, viscous fluid or air.

Comparing cushions

The author compared several cushions to enable her to provide the best products for her service. The cushions she compared ranged from a 2 inch viscoelastic foam cushion, to a flat solid gel cushion, to the latest cushion that has pyramid cells within an air environment.

The pyramid cushion has pyramid air cells that are able to move against each other; they are inside an air cushion that has a welded seam down the centre

to prevent the pyramids shifting to one side. While the author feels these cushions will provide good stability, they may not be as good as foam cushions due to patients reporting being unable to alter the pyramids' pressure and finding the cushion too firm compared with static air cushions.

Gel cushions

The 1 cm gel cushion that the author looked at was ideal for not affecting the seating height of the chair. However, the author felt it would not provide such good pressure-reducing properties over bony prominences as some of the static air or foam cushions. The reason for this is that, as NPUAP (2014) suggested, the body immerses into cushions, which are designed to increase the body surface area in contact with it (reducing interface pressures); however, this is can't be the case with the gel cushion due to the minimal depth for immersion.

Viscoelastic foam cushions

Viscoelastic foam cushions are able to mould to the individual to redistribute body weight. Therefore, the height of the cushion should not create an issue with the chair's armrests or the distance from the patient's knees to the floor. One concern with viscoelastic foam cushions is that they are heat-sensitive, making these cushions too soft for some individuals and too firm for others.

Foam cushions

Foam cushions are possibly the most common among manufactured cushions and differ in size, colour and quality. The foam cushions vary between one-, two- or three-piece cushions. The recommended minimum and maximum weights of person under whom the cushion functions best depends on the quality of the foam. If the patient were at the maximum end of the cushion's weight capacity, bottoming out or longevity may occur. The majority of cushions used for the heavier patient will either have another material, such as gel, within them or contain a deeper foam layer. Foam varies in density and the higher density foam tends to be more durable. Foam cushions are relatively inexpensive.

For some patients, foam provides a stable support surface when used in their chair or sofa. Foam can be machine-profiled (castellated) to maximise the

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contact area; however, some companies that leave the foam as a slab would debate this. The Australian Wound Management Association (2012) describes castellation as partial-thickness cuts made in a regular block pattern on the top section of the foam. These cuts in the foam are intended to increase the surface contact area between the patient and the cushion to reduce friction and shear. NICE (2014) suggested there was no clinical difference between a high-specification foam cushion and a slab foam cushion.

While it is thought that foam cushions are easy to use, in the author's experience, despite some manufacturers printing 'use this way up' on cushion covers, such cushions have been used upside down. The covers are generally made of multi-stretch or two-way breathable materials. While their seams are welded or taped to prevent ingress of fluid, inspection of the foam should be possible via a covered zip. The majority of NHS cushions are 45 cm x 45 cm but, from the author's observations, they are too small to fit on furniture; this makes it difficult to individualise all referrals. All materials within the foam cushion should be fire-retardant, and the levels of and certificates for this should be provided by the manufacturer.

A concern when using foam is the height of the cushion when using it on upholstery furniture, as most social living chairs are not designed to account for an added pressure cushion. This added height results in potentially poor posture (sacral sitting) due to the seating now being too high, or stability being a concern. If the upholstery cushion can be removed, some pressure cushions can go directly onto the base; however, other issues may develop, such as the height then being too low or gaps emerging around the pressure cushion.

According to NICE (2014), a gel-filled pad within a pressure-reducing cushion was clinically beneficial compared with only foam for reducing the incidence of PUs. Medline Industries (2008) suggested gel and air cushions have been shown to be the most effective for pressure relief.

Static air cushions

Static air cushions, due to the nature of the material, are light and easy to mould into. Some cushions come with a strap to secure them to the chair. The ability of static air cushions to accommodate very low body weight is excellent and, equally, they can support heavier individuals.

Stability is the biggest concern when assessing sitting and, if the individual has a tendency to lean, there is nothing within the cushion to correct this. Due to static air cushions relying on air, punctures render these cushions unusable, which makes their cost in relation to their longevity a necessary consideration when prescribing. Through interface pressure mapping, Levy et al (2014) compared air cell cushions to flat-foam cushions for spinal cord injury patients in wheelchairs. They reported that the mechanical stresses in muscle, fat and skin tissue under the ischial tuberosities during sitting were better when the participants used air cell rather than foam cushions.

The search for pressure cushions to insert into recliner chairs has always proved difficult due to the height of armrests. Using a cushion also affects the overall knee-to-floor height of seats, resulting in the possibility of sacral sitting. The objectives must always be to use a low-profile, easy-to-use cushion, which can accommodate low and high body weight and provide cost effectiveness.

CLINICAL RESEARCH AND PRACTICE

The Royal College of Nursing (RCN) (2005) suggested that, despite there being research into pressure mattresses, better reporting of studies was necessary; they did not mention research into pressure cushions. The improved reporting the RCN felt could fill some of the research gaps included adequate description of the devices, reporting adverse effects on patient quality of life, economics evaluation and evaluation in the community setting.

Turner (2006) stated that there is no substitute for hands-on experience when prescribing a cushion to reduce pressure, and that no single cushion is likely to be appropriate for all situations. This may reflect the wider beliefs of many clinicians and manufacturing companies. However, Vanderwee et al (2008) agreed with the RCN, and suggested that the scarcity of reliable information from high-quality clinical trials results in clinicians using their own opinion rather than clinical evidence.

EVALUATION

As community-based patients purchase their own seating and clinicians support care by offering advice and/or providing pressure cushions, patients often establish their priorities based

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Figure 4. The SSKIN care bundle elements (NHS Midlands and East, 2012) .

Surface: make sure your patients have the right support
Skin inspection: early inspection means early detection.
 Show patients and carers what to look for
Keep your patients moving
Incontinence/moisture: your patients need to be clean and dry
Nutrition: help patients have the right diet and plenty of fluids

on their lifestyle choices. However, a patient's priorities may not fit in with the available research and advice regarding pressure cushions. This means a compromise between what is the ideal clinical seating and what is manageable for the patient's lifestyle and capabilities may be necessary.

We are led to believe that research and clinical evidence should be the way forward and should govern our decision-making. As the research into pressure relief in community seating is limited and the majority of pressure-relief research concerns wheelchair users, it is understandable that the advice is based largely on consensus opinion and hands-on experience.

A vast array of cushions and seating options are available but, as helpful as these devices may be, they are no substitute for attentive care. An example of a simple and holistic approach to preventing pressure damage is the SSKIN (Surface, Skin, Keep, Incontinence, Nutrition) Bundle assessment tool (Figure 4). Patients require individualised repositioning schedules regardless of the equipment used. Equally, cushions or seats should not be solely prescribed on their ability to manage tissue load (pressure) but must be prescribed based on assessment for posture, ability to transfer, comfort and how they sit within the patient's lifestyle choices.

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