

Seating and positioning support with an air-filled, non-slip, segmented-design cushion

There are many factors to consider when addressing pressure ulcer prevention in the seated patient, including stability, maintaining maximum patient function and comfort. With its unique and clinically proven AIR FLOATATION technology, the ROHO® MOSAIC® cushion uses a system of interconnected cells to evenly distribute forces, so conforming to the individual's seated shape. This cushion provides efficacy, functionality and adjustability, and is available at an affordable price.

KEY WORDS

- » Pressure ulcers
- » ROHO MOSAIC cushion
- » Seated patients
- » Skin breakdown

Pressure ulcer (PU) prevention is a 24-hour activity and whilst a lot of attention is focused on specialist support surfaces, such as mattresses, less attention is given to prevention in the chair. This is counter-intuitive, as the seated individual is subjected to high interface pressures because of the small contact area between the body (the buttocks) and the surface (the seat of the chair or specialist cushion). Seated patients may be at risk of developing a PU or, indeed, live with a PU for many years. As such, the role of seating is recognised within both national (NICE 2014) and international guidelines (NPUAP, EPUAP, PPPIA 2014). NPUAP et al (2014) define pressure-redistributing surfaces as: *“specialized devices for pressure redistribution designed for management of tissue loads, microclimate, and/or other therapeutic functions (i.e., any mattress, integrated bed system, mattress replacement, overlay, seat cushion, or seat cushion overlay)”*.

Although time in the seated position can have a significant effect on the development of PUs — including increased risk and altered location of occurrence — literature regarding seating is sparse. The majority of published information on cushions relates either to wheelchair users (e.g. Crane et al, 2016) or patients in specific sub-populations, such as those with a spinal cord injury (e.g. Cho et al, 2015). Consideration has been given to the provision of appropriate armchairs within hospital settings (Collins 2000); however, this advice has not been recently updated and little discussion has been had about seating in the home environment,

where equipment may consist of a specialist cushion to be used within a standard armchair or on the patient's own sofa.

This being said, there are numerous factors that need to be addressed when considering PU prevention in the seated patient — support needs to be stable, optimise patient function and also be comfortable, as patients (particularly in the community) may sit in the chair for extended periods of time throughout the day (Soneblum et al, 2015). These considerations include:

- » The overall dimensions of the chair and any impact a cushion may have on these
- » The normal position of the pelvis and whether this needs to be corrected
- » The length of time patients are likely to be in a chair, their comfort and likely concordance
- » Preservation or improvement of mobility and independence
- » The relationship between pressure, shear, friction and microclimate that the patient encounters.

DEVELOPMENT OF THE ROHO RANGE

For over 40 years, ROHO has manufactured products to meet the needs of individuals who require a variety of seating or positioning support. The uniqueness of ROHO products lie in their ability to conform to the individual's seated shape, providing skin and soft tissue protection via patented shape-fitting technology, which evenly distributes the forces of body weight and reduces the effect of friction or shear on tissue. In addition to the ROHO MOSAIC cushion, which this article

JACQUI FLETCHER
Independent Nurse Consultant

Box 1: Immersion and envelopment (NPUAP, 2007)

Immersion:

Depth of penetration (sinking) into a support surface.

Envelopment:

The ability of a support surface to conform to fit to irregularities of the body.

discusses in more detail, the range also includes the ROHO PRODIGY® Mattress Overlay, the ROHO AGILITY® Back Systems and the ROHO Toilet Seat Cushion, as well as ROHO cushions that have been specifically designed for use with wheelchairs (ROHO, 2015). ROHO is now a part of the Permobil family of companies. As leaders in the complex rehabilitation power wheelchair industry, Permobil has a record of influencing the market with innovative seating and mobility solutions.

ROHO's patented technology was first developed by Robert H. Graebe in the 1970s; his concern at seeing his first pressure ulcer led to development of an innovative technology that uses air to simulate how water equalises pressure. The important principles behind this technology are as follows (ROHO, 2001):

» **Low surface tension:** A patient can be immersed and enveloped into the material

without tissue becoming deformed due to the unique cellular design, which minimises the chance of skin breakdown (*Box 1*)

» **Constant restoring forces:** The forces and pressures pushing back are kept equal at all points. As the patient's body is immersed, greater contact is achieved for pressure dispersion, thus minimising pressure on any one area.

The combined forces of friction and shear inhibit blood flow, but the non-slip surface of the cells combined with independent movement of each cell reduces these forces as the patient moves (ROHO, 2001). Over 90 scientific and clinical studies have been undertaken, which verify that products using ROHO technology treat and prevent skin breakdown and pressure injuries, including deep tissue injuries. Various pieces of evidence are provided in *Table 1*, with a specific case study for the ROHO MOSAIC

Table 1. Published evidence demonstrating positive outcomes with ROHO products across a variety of complex aetiologies

Title/reference	Case study overview	Product used	Outcomes achieved with ROHO product
Addressing the tissue tolerance and postural needs of an active hemipelvectomy client (Fleck and Eubank, 1998)	Positioning and skin management of a high-risk spina bifida patient with a hemipelvectomy	ROHO DRY FLOATATION HIGH PROFILE QUADTRO cushion	The patient was able to achieve proper positioning. The cushion accommodated her fixed pelvic obliquity, providing stability for an active life. All peak pressures were diminished, decreasing ischaemia risk and possible tissue necrosis
Healing an ischemic ulcer (pressure ulcer) in a seated client (Fleck, 1997)	Management of a recalcitrant ischaemic ulcer in a young, active T4-paraplegic patient	ROHO DRY FLOATATION HIGH PROFILE QUADTRO cushion	The cushion provided a therapeutic environment and simultaneously addressed positioning needs. The patient's ulcer closed within 3 months
Addressing an Elderly Client's Stage IV Ischemic Ulcer in Long Term Care (Thornton and Fleck, 1999)	Management of a Stage IV pressure ulcer to the coccyx	ROHO DRY FLOATATION Mattress System and ROHO HIGH PROFILE cushion	The pressure ulcer was 100% granulated and healed to closure with 3.5 months using the mattress system, with the cushion in the patient's wheelchair addressing seated pressure distribution needs. The patient was then placed on a PRODIGY Mattress Overlay to prevent further damage
Long-term Success Myocutaneous Flap (Doe, 2001)	Management of a complex patient with multiple pressure ulcers, who had received debridement and muscle flap procedures, which repeatedly failed in spite of proper management and care	ROHO DRY FLOATATION Mattress and ROHO HIGH PROFILE wheelchair cushion	The mattress provided the correct environment for wound healing, applying enough pressure to the flap site to maximise oxygen and nutrient exchange to the skin, without cutting blood flow. The cushion provided a therapeutic seating surface.
Management of Chronic pain with Non-powered support surfaces (Fleck, 1999)	Wound management in a patient with end-stage prostate cancer and bone metastasis, loss of appetite and chronic pain	PRODIGY Mattress System and ROHO AIR FLOATATION MOSAIC cushion	This terminally ill patient used the mattress system and seated support without pain or discomfort during his stay at a hospice. He had no tissue breakdown or PUs during treatment, despite multiple risk factors

cushion expanded in *Box 2*. The final example in this table demonstrates the importance of creating a care plan that is reasonable and specific to the patient. In this case, the patient had a terminal illness and chronic pain, and his status had declined to the point of admission to a hospice. Combined use of the PRODIGY Mattress System for his bed and the ROHO MOSAIC cushion for periods when he was seated in a chair allowed improvement to his quality of life while he was in the hospice, during which time he incurred no tissue breakdown or PUs despite multiple risk factors, including receiving chemotherapy and radiation, low serum albumin, poor appetite and low body weight.

THE ROHO MOSAIC CUSHION

An appropriate pressure-redistributing cushion in a seated patient should enhance the person's functionality, should increase the time they can spend seated without tissue breakdown and should support the healing of damaged tissue. Such a cushion should serve as an interface between the seating surface and the contours of the human body (Graebe, 1987).

The ROHO MOSAIC cushion is a non-slip, adjustable, air-filled, segmented-design support surface that uses AIR FLOATATION technology, with interconnected cells that evenly distribute forces allowing the cushion to conform to the individual's seated shape. Air is released through a valve until the patient is immersed but still

suspended above the chair surface at approximately 1.2 cm. This allows an equal distribution of pressure, protecting prominences such as the hips (ROHO, 2001). The ROHO MOSAIC cushion is provided with a hand pump and instructions, and can be ordered with a standard ROHO cover or with the ROHO Stretch Incontinence Cover for a small additional cost (ROHO, 2005).

The ROHO MOSAIC cushion is suitable for individuals who are at risk of skin or soft tissue breakdown; currently have skin or soft tissue breakdown; have normal or impaired sensation; require accommodation of pelvic asymmetry, up to approximately 2.5 cm; or, who require enhanced comfort to their seating surface. The cushion has a number of benefits that make it an ideal choice for patients who require a supportive seating device (ROHO, 2001; ROHO, 2013; ROHO, 2015):

- ▶ **Comfortable:** The ROHO MOSAIC cushion adapts to the patient's seated shape, providing a comfortable and stable seating environment. The cushion must be properly sized to the individual, with a weight limit of 113 kg. If the patient's chair does not provide a firm foundation, the recommendation is to use a ROHO Planar Solid Seat Insert alongside the cushion for best results
- ▶ **Simple:** The adjustable ROHO MOSAIC cushion features interconnected air cells that are simple to set up, inflate and adjust, making the cushion easy to use in any care setting. Moreover, the cushion is non-powered so is quiet and does

Box 2. Implementation of the ROHO MOSAIC cushion for an elderly patient with dementia

This 87-year-old lady has a history of vascular dementia and falls. She recently had a chest infection, which meant she was much less active than normal and started to complain of sacral pain. She is 4ft 10, so struggles to touch the floor with her feet in some seating. She has also recently had significant weight loss and now weighs just 7 stone. The ROHO MOSAIC cushion was chosen for a number of reasons:

- ▶ The sacrum was intact on examination, but the area was red and the lady was complaining of discomfort – the ROHO MOSAIC cushion was chosen to prevent further damage
- ▶ Due to the low profile of the ROHO MOSAIC cushion, it can be used on a "normal" chair without risk of raising the seating height above the chair arm height and therefore increasing the risk of a fall
- ▶ The cushion did not raise the height of the seating surface too much so the lady could still place her feet on the ground
- ▶ The lady has carers visiting four times a day who all have different skills. The ROHO MOSAIC cushion is simple and easy to implement, so little training or education was needed for these individuals
- ▶ Concordance can be an issue due to this lady's dementia, but she found the cushion very comfortable and was eager to continue using it
- ▶ Due to the segmented design, the lady felt stable and did not slide forward in her chair.



not require an electrical power outlet

» **Lightweight:** Weighing in at just 0.5kg, the ROHO MOSAIC cushion is lightweight and thus easy to move and handle

» **Adjustable:** The flexible interconnected cells of the ROHO MOSAIC cushion can be adjusted to closely support the different shapes and sizes of patients' bodies, as well as being designed for adjustment to facilitate blood flow as a patient's needs change over time

» **Cost-effective:** The ROHO MOSAIC cushion is available at an affordable price, making it a cost-effective pressure-redistributing solution that offers numerous benefits to suit individual patient requirements. As it is manufactured from PVC (made without DEHP), it is extremely robust and can be hand-washed, while the cushion cover can be machine-washed. If cleaned and disinfected appropriately (following manufacturer's guidelines), the cushion can be used for multiple individuals.

Most importantly, the ROHO MOSAIC cushion is an efficacious option. The pressure maps in *Figure 2* were both taken from a 56-year-old female patient with chronic fibromyalgia. The two images provide a comparison of pressure redistribution with a standard foam cushion versus a ROHO MOSAIC cushion (ROHO, 2001), showing that pressure was far more evenly distributed with the latter option for this patient.

CONCLUSION

Access to appropriate seating and positioning support is very important for seated individuals, who can be subject to significant interface pressures due to the small contact area between the body and the seated surface. This article presents the ROHO MOSAIC cushion, which has a non-slip, adjustable, air-filled, segmented design that utilises AIR FLOATATION technology. This uses air to simulate how water equalises pressure, in order to evenly distribute forces so the cushion conforms to the patient's body shape. The ROHO MOSAIC cushion offers a simple and cost-effective solution, which appears to be well tolerated by patients across a range of care environments. **WUK**

REFERENCES

Cho K, Beom J, Yuk J et al (2015) The effects of body mass composition and cushion type on seat-interface pressure in spinal cord injured patients.

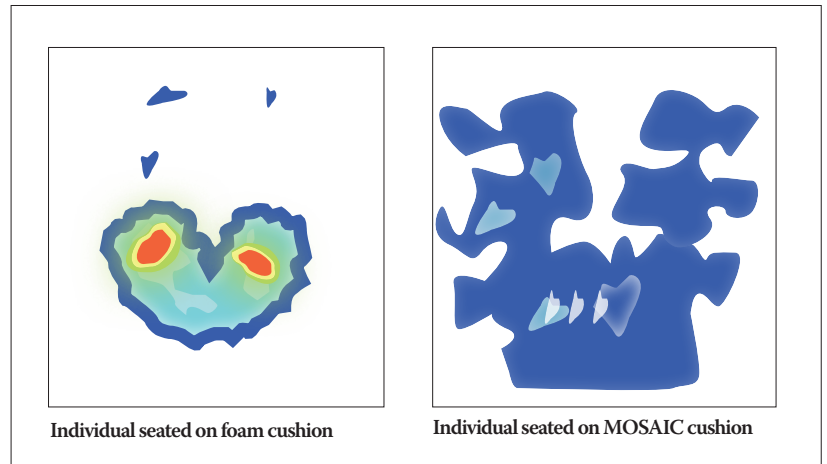


Figure 2. Comparison of pressure distribution for a foam cushion versus a ROHO MOSAIC cushion

*Ann Rehabil Med*39(6):971–9

Collins F (2000) Selecting the most appropriate armchair for patients. *J Wound Care*9(2): 73–6

Crane B, Wininger M, Call E (2016) Orthotic-style off-loading wheelchair seat cushion reduces interface pressure under ischial tuberosities and sacrococcygeal regions. *Arch Phys Med Rehabil*97(11):1872–9

Doe D (2001) *Long-Term Success Myocutaneous Flap. Clinical Case Study.* Available at: <https://roho.com/library/myocutan.pdf> (accessed 21.02.17)

Fleck C, Eubank A (1998) *Addressing the Tissue Tolerance and Postural Needs of an Active Hemipelvectomy Client.* Available at: https://roho.com/library/Addressing_Tissue_Tolerance.pdf (accessed 21.03.17)

Fleck C (1997) *Healing an Ischemic Ulcer (Pressure Ulcer) in a Seated Client.* Available at: https://roho.com/library/Seated_Client002.pdf (accessed 21.03.17)

Fleck C (1999) *Management of Chronic Pain with Non-powered Support Surfaces.* Available at: <https://roho.com/library/chronicp.pdf> (accessed 21.03.17)

Graebe R (1987) *Cushioning to Benefit Tissue Viability.* Rehabilitation Report 3(11). Available at: https://permobilus.com/wp-content/uploads/2016/12/RehabR_Cush-TissueBene-2.pdf (accessed 15.03.17)

Mossman B, Hampton S (2016) Effectiveness of a pressure-redistributing cushion for low-to-medium-risk patients in care homes. *Br J Community Nurs* (Suppl):S29–30, S32–6

National Pressure Ulcer Advisory Panel, European Pressure Ulcer Advisory Panel, and Pan Pacific Pressure Injury Alliance (NPUAP, EPUAP, PPPIA) (2014) *Prevention and Treatment of Pressure Ulcers: Quick Reference Guide* (ed.) Haesler E. Cambridge Media, Perth, Australia

NPUAP (2007) *Terms and Definitions Related to Support Surfaces.* Available at: http://www.npuap.org/wp-content/uploads/2012/03/NPUAP_S3I_TD.pdf (accessed 05.04.17)

NICE (2014) *Pressure Ulcers: Prevention and Management.* Clinical guideline [CG179]. Available at: <https://www.nice.org.uk/guidance/CG179> (accessed 05.04.17)

ROHO (2015) *ROHO MOSAIC Cushion Sell Sheet.* Data on File

ROHO (2013) *ROHO MOSAIC Cushion Operation Manual.* Data on File

ROHO (2001) *What is DRY FLOATATION technology?* Available at: <https://roho.com/library/EverybodyBro.pdf> (accessed 15.03.17)

Soneblum S, Springle S, Cathcart J et al (2015) 3D Anatomy and deformation of the seated buttocks. *J Tissue Viability*24(2):51–61

Thornton B, Fleck C (1999) *Addressing an Elderly Client's Stage IV Ischemic Ulcer in Long Term Care.* Available at: https://roho.com/library/CaseStudy_ischemi6_08.pdf (accessed 21.03.17)

Declaration of interest
This paper was supported by Permobil Ltd