Parafricta™ in Prevention of Shear and Friction Forces in ‘At Risk’ patients

Sylvie Hampton MA BSc (Hons) DpSN RGN; Andy Kerr. RN DipHE; Cathie Bree-Aslan RGN DipN RSHom DipHERB. Tissue Viability Consultants, Eastbourne Wound Healing Centre
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Introduction

Pressure ulcers continue to be an enormous healthcare problem affecting large segments of the patient population. A Pressure ulcer is defined as an area of localised damage to the skin and underlying tissues caused by pressure, shear, or friction (European Pressure Ulcer Advisory Panel 1998) and are caused by a local breakdown of soft tissue as a result of compression between a bony prominence and an external surface (European Pressure Ulcer Advisory Panel (EPUAP) 2003).

Pressure ulceration in elderly patients is associated with a fivefold increase in mortality, and in-hospital mortality in this group is 25-33%. Estimates of the cost of pressure ulceration to the NHS range from £180m to nearly £2bn a year (Grey, et al. 2006). Therefore, early identification of patients that are at risk of developing pressure ulcers is vital in preventing the more serious consequences of an open and infected wound. As part of the assessment of these at risk patients, the nurse should be aware of the shear and friction forces that can increase the risk for the patient.

There is an established and significant relationship between friction and shearing forces and the development of pressure ulcers (Fisher et al. 2004). Therefore, if the risk potential for these forces are identified and removed, the possibility of pressure damage will be decreased. A new material (Parafricta™) has been designed specifically to reduce the mechanical stresses such as friction and shear and, therefore, will reduce the potential for pressure ulceration.

Shear forces occur when a part of the body tries to move but the surface of the skin remains fixed. Shear force is generated by the motion of bone and subcutaneous tissue relative to the skin, which is restrained from moving due to frictional forces (for example, when a seated patient slides down a chair or when the head of a bed is raised more than 30° and the patient slips down). This can be demonstrated by placing the knuckle of one finger in the palm of the other hand. When pressed down and moved within the palm, the skin of the knuckle remains in one position and the bone moves under the skin and damages the tissue layers that slide against each other. By this action, the pressure needed to occlude underlying blood vessels is greatly reduced. Therefore, when combined with gravity/force (pressure), friction causes shear and the outcome can be more devastating than pressure alone (Clay, 2004). In elderly patients, a reduced amount of elastin in the skin predisposes to the adverse effects of shear, increasing the risk in this group.
Friction opposes the movement of one surface against another and is against the body’s resistance to movement which can cause abrasions (Waterlow, 2005). It occurs when shear has allowed the bone to slide inside the skin to a point that it can go no further. The skin is then dragged over the surface, causing friction. This friction can lead to the formation of blisters, which in turn leads to superficial skin erosions (figure 1), thereby, accelerating pressure injury (Grey and Enoch, 2006). Such forces can also occur, when a patient is dragged across a bed sheet or as a result of ill fitting prosthetic devices or footwear (Grey and Enoch, 2006). Friction without force (pressure) causes damage to the epidermis and upper dermal layers and is most commonly known as "sheet burn."

When the two forces of shear and friction are combined with pressure, the outcome can be more devastating than pressure alone (Clay, 2004). However, although the forces are frequently implicated in tissue damage, it is often possible to remove or reduce these stresses. Devices used for this purpose are varied (Hampton, et al. 2003) and the Parafricta™ material is possibly the simplest and an effective device to use for this purpose.

Parafricta™ is a new fabric with low friction properties which is designed to remove or reduce the damaging effects of shearing and friction on the immobile patient and this is now being shown to provide protection against the skin injury due to friction and shear (Kerr, 2007; Bree-Aslan and Hampton 2008; Hampton, 2007).

Obviously, if there is pressure present, then this should be reduced by placing the patient on the most appropriate surface in both the chair and the bed. However, if superficial skin damage continues even with use of the equipment, then friction and shear could be the cause. This is when Parafricta™ is extremely useful.

The most common sites for friction and shear damage are the heels or the buttocks. Parafricta™ is an ideal material to counteract the occurrence of shear in these areas, and therefore, applying undergarments (figure 2) or bootees (figure 3) made of Parafricta™ will support a reduction of these forces.
Parafricta™

Parafricta™ fabric is smoother than silk and easy to launder at 160°C Celsius. It has a low coefficient of friction (close to that of ice) and an absence of "stiction" with high tensile strength that is close to that of steel. The action of Parafricta™ material lowers the potential for shearing (figure 4).

Shearing forces will only exist if pressure, from the patient’s own body weight, is also present and occur when a part of the body tries to move but the surface of the skin remains fixed (Waterlow, 2005). In other words, shear forces are the forces transferred internally to the patient and the supporting surface when they are placed under load usually in opposite directions to the applied load or movement. This material is also supplied in the form of sheets and pillow cases (figure 5).

The undergarment can be opened fully and easily applied by slipping it under the body and then closed using the velcro closures (figure 6).
Figures 7 to 11 demonstrate how Parafricta™ can aid the reduction of shear and friction forces in the patient who constantly slides in the chair, and a series of case studies report the consistency of these results (Kerr, 2007; Bree-Aslan and Hampton 2008; Hampton, 2007).
Figure 7: This patient’s skin is macerated and broken through the combination of sweat and shear forces. Parafricta™ undergarments were provided in order to reduce the potential for damage.

Figure 8: Within 6 days, the damaged tissue is repairing and no longer macerated.

Figure 9: Following 8 days of wearing Parafricta™ undergarment and the surrounding tissue is no longer macerated and the remaining wounds are clean and healing.

Figure 10: This patient had sore and broken skin over his buttock area. It had been present for several months, even though he was on an air mattress for 23 out of a 24 hour day.

Figure 11: In less than one week, the soreness had disappeared and the skin was clear. The only change to care was the pants that he wore day and night.
Prevention of heel ulcers

Excellent mattresses do not always protect the heel adequately, and pillows are often used to support the leg, leaving the heel free of pressure as it ‘hangs’ over the edge of the pillow. The problems associated with using pillows in this way, is the pillow (or the patient) can move and the heel can end up directly on the pillow with a potential increase in pressure over the bony prominence. There is also a possibility that strain will be placed over the Achilles tendon placing that area at increased risk.

The use of pillows, massage and water-filled gloves under the heels have been traditionally used. However, the N.I.C.E. guidelines recommend that these are not used in prevention because each can increase the damage to pressure areas.

Heel ulcers are costly and, if not treated promptly and properly, may lead to osteomyelitis and even limb amputation (Black 2004). Unfortunately, the incidence and prevalence of heel pressure ulcers is increasing (Collier, 2000; Meehan, 1994) and this cannot simply be blamed on poor nursing (Dickson, 1987 cited by Donnelly, 2001) or on inadequate pressure relieving equipment as arterial disease and shearing forces all add to the potential of tissue damage (figure 12). Nevertheless, the one thing is for certain is that assessment and planning for the protection of heels should be different than that of normal assessment as the heels will not behave under pressure in the same manner as the sacral area. Therefore, Parafricta™ bootee (figures 3, 12-14) can be extremely useful.

![Figure 12. The effect of friction, shear and pressure on the heel](image1)

![Figure 13 Parafricta™ bootee in situ](image2)

![Figure 14. A healthy heel in a patient using Parafricta™ bootee](image3)
Conclusion

The complexities of pressure ulcer formation can be assessed, and by using an evidence based approach, these ulcers can generally be avoided. The use of pillows, massage and water-filled gloves under the heels should be discontinued unless the practitioner can be assured that the heel will remain free from contact with the items and be free of the associated pressure. The united forces of pressure, shear and friction are very powerful and require proactive and clinically sound measures to prevent damage from occurring and the Parafricta™ material is a simple and effective method of reducing the effect of these forces.

References

Kerr, A. (2007) Reducing shear and friction: Parafricta undergarments Nursing Residential Care, 19 Dec, 10(1), 626 – 628

Sizing Charts for Parafricta Garments

### Bootee

<table>
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### Undergarment

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### Pillowcase Dimensions

710mm long by 480mm wide (27.9" x 18.9")

### Single Fitted Bedsheet Dimensions

1900mm long by 900mm wide (74.8" x 35.4")

ORDERS CAN BE EMAILED TO: info@parafricta.com or ordered on-line.

Tel: Freephone 0800 0431412 [UK only]

From outside the UK: +44 1252 816900

www.parafricta.com
Parafricta™ Products offer significant benefits in:

- Protection of fragile skin
- Avoidance of pressure sores
- Retention of chronic wound dressings
- Quality of sleep
- Patient comfort

Through Parafricta™ Fabric’s unique properties:

- Low coefficient of friction – protects the skin
- Absence of ‘stiction’ on the skin – avoids shear
- Washable at high temperatures – easy to keep clean and hygienic
- High tensile strength – durable in use
- Breathable – comfortable in use

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