

Evaluation of the efficacy of a new mattress technology by mapping the pressure on the trochanter major in healthy volunteers

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Introduction

Pressure ulcers are a common complication of several disease states. As reported in the literature, their occurrence varies widely, with incidences in hospitalized patients ranging from 2.7%-29% and a prevalence ranging from 3.5% in a general hospital population to 69% for elderly patients admitted to acute care hospitals for non-elective orthopedic procedures, such as hip replacement and treatment of long bone fractures¹⁻⁴. One of the primary anatomical locations of pressure ulcers is the trochanter major. It is estimated that 15% of all cases of pressure ulcers occur at this site⁵.

Pressure ulcers are caused by a combination of pressure, friction, and shear. At a microscopic level, pressure exceeding capillary pressure causes the collapse of these capillaries, which, in turn, leads to ischemia and reperfusion injury. This occurs first in the muscles, resulting in development of the primary lesions⁶. In addition, moisture and aggressive enzymes from feces or urine in incontinent patients may lead to breakdown of the protective properties of the epidermis and, thus, may contribute to the formation of pressure ulcers.

In addition to the high morbidity and mortality related to pressure ulcers, the complications (infection) and cost of treatment associated with them are substantial. The Agency for Healthcare Research and Quality found that the average stay for patients admitted to a hospital for the treatment of pressure ulcers was 13 days with an average cost of US \$37,500 per hospital stay.

Prevention of pressure ulcers requires a series of interventions that are dependent upon the patient, mobility and nutrition status, as well as other factors. Central among these interventions is regularly changing the patient's position and the use of pressure relieving or pressure distributing surfaces.

Surface Modification Technology (SMT™) is a technique used for altering a foam surface. This process results in better redistribution of pressure that reduces friction and shear, and enhances circulation. Variable Pressure Foaming (VPF™) is a technique used to create different levels of support within a mattress construction that allows for a very high level of pressure redistribution, envelopment, and maximum comfort[¶]. When SMT is combined with VPF, the average and, more importantly, maximum pressure on pressure-ulcer prone areas of the body such as the trochanter is reduced.

The VPF/SMT mattress was shown to offer impressive average and maximum weight reductions in a pressure mapping experiment versus a series of viscoelastic mattresses with this technology⁷.

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Test method

Pressure on the left trochanter major was measured in ten healthy volunteers (4 male, 6 female) in the left lateral position, using a single sensor tissue interface pressure test. The average age of the volunteers was 65.5 years (range: 60.0 - 70.0) and their average weight 181.1 pounds (range: 93.0 - 233.0). The average body mass index (BMI) was 29.5 kg/m² (range: 18.2 – 38.9): four subjects were obese (BMI \geq 30) and 2 were morbidly obese (BMI \geq 35). A mattress with VPF/SMT technology was compared to a widely used, regular standard polyurethane static mattress. Each volunteer was allowed to settle in the mattress for 10 minutes.

Three separate measurements were taken for each individual, and the highest measure was recorded.

Results

For the conventional, non-VPF/SMT mattress, the average pressure was 94.2 mmHg \pm 15.2 (range: 78.6 - 119.3) and for the VPF/SMT mattress this value was 47.2 mmHg \pm 6.8 (range: 38.0 - 56.0) (Figure II).

On average, the reduction in interface pressure was 49.2% (range: 37.8 - 58.8) (Figure III).

Conclusion

The pressure on the trochanter major of healthy subjects was shown to consistently be much lower on the VPF/SMT mattress than on a standard static mattress. The superiority of the VPF/SMT versus the standard technology was indicated by the 49.2% reduction of the average pressure on the VPF/SMT mattress. In addition, the lower standard deviation, found in the VPF/SMT mattress measurements, indicates a higher level of consistency in pressure reduction.

In the clinical situation, this is likely to contribute significantly to reducing the risk of pressure ulcer development in the trochanter, one of the areas of the body most prone to pressure-related problems.

A study in a relevant patient population would have to be performed to prove this assumption.

References

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Figure I
Surface Modification Technology

The density within one piece of foam varies, thus allowing for different levels of pressure distribution.

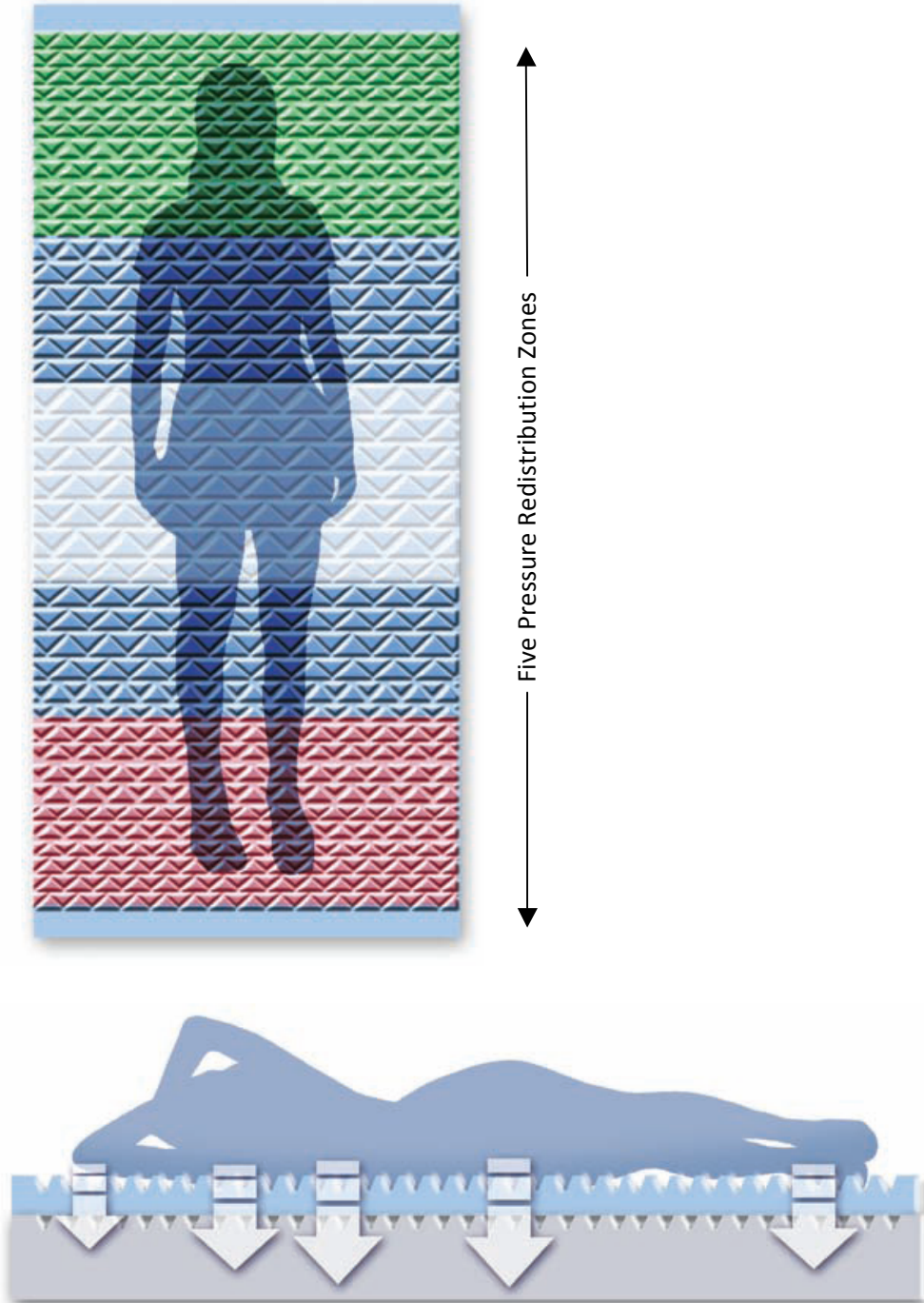


Figure II

Trochanter pressures in 10 volunteers: Bodyzone vs. Non-VPM/SMT mattresses

**Average reduction
interface pressure:
49.2% (37.8-58.8)**

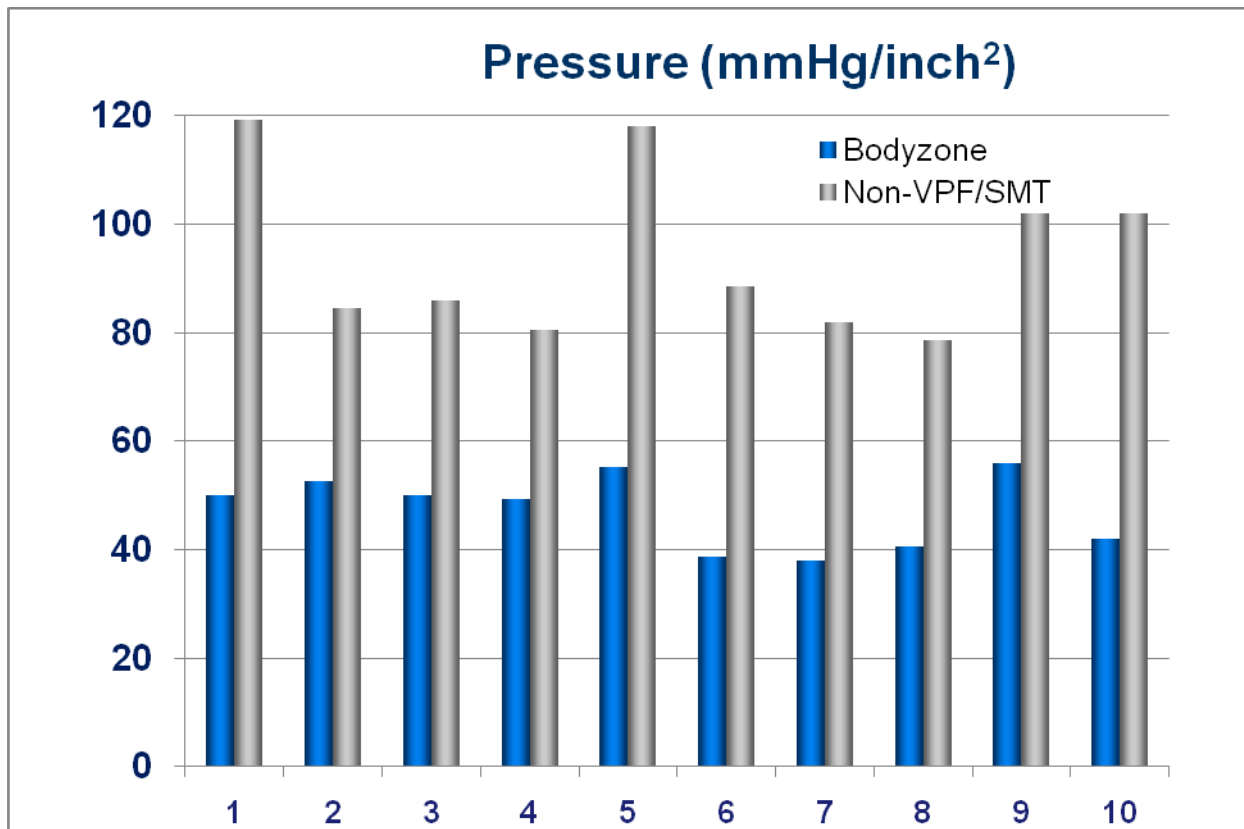


Figure III

Comparison of Bodyzone vs Conventional Support Surfaces: Trochanter major

Summary of Results

	Average Pressure (mm Hg)	Range (mm Hg)
Bodyzone 500	47.2 ±6.8	38.0 – 56.0
Conventional	94.2 ±15.2	78.6 – 119.3

Bodyzone provided an average reduction in interface pressure of **49.2%** (range 37.8 – 58.8)