Laboratory based comparison of the effect of two seat cushions upon interface pressure and envelopment

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Background

Pressure ulcer prevention has long been focused upon the reduction of the magnitude and duration of skin and soft tissue loading. This approach has seen a wide range of pressure-redistributing (PR) patient support surfaces introduced into health care facilities over the past thirty years. Surrogate non-invasive outcome measures of support surface effectiveness such as the pressure exerted by the support surface upon the skin have been widely reported. This evaluation compared ischial tuberosity contact pressures of two pressure redistributing cushions.

Method

This evaluation measured ischial tuberosity contact as the subjects sat upon two alternative seat cushions - Frontier Medical Repose® cushion and the Waffle® cushion (EHOB Inc). All devices investigated in this study were CE marked and used within their intended purpose. The evaluation had MREC approval.

- Ten adult volunteers (aged over 18 years with no upper limit; five male and five female) were invited to sit upon the support surface after providing informed consent to participate.
- The order of presentation of the support surfaces to the subjects was made using a pre-determined randomisation schedule.
- Contact pressure was measured using a XSensor 3.0 (Xsensor Technology Corporation, Canada) pressure measurement mat with surface dimensions of 44 cm x 44 cm with 1296 sensors.
- The volunteers were invited to sit down for ten minutes upon each cushion with pressures recorded at the ischial tuberosities

Results

Table 1. Subject demographic information

Subject	Mean	Standard deviation	Range
Age (years)	37.33	15.51	20 - 57
Weight (kgs)	74.46	13.96	50.9 – 91.55
Height (cm)	167.08	11.06	151.8 – 188.9
BMI	26.67	4.53	19.9 – 32.2

- When seated there were statistically significant differences between the performance of the two cushions (Table 2).
- The contact pressures upon the Waffle were higher than were exerted by the Repose cushion (t=-4.48, df=8, p=0.002) while the gradient between the highest pressure and the lowest pressure measured by an adjacent sensor tended to be higher upon the Waffle cushion than the Repose (t=2.27, df=8, p=0.053).

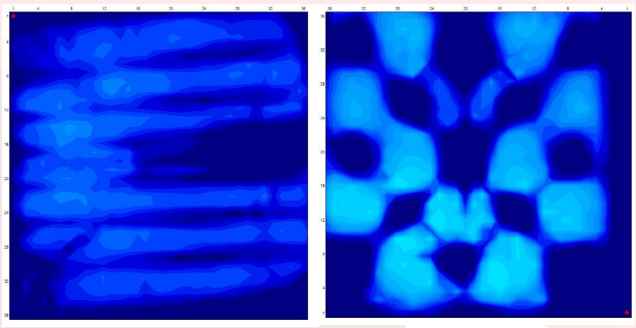
Table 2. Mean contact pressures

Cushion	Peak (SD)	Gradient (SD)	Contact area (SD)
Repose®	65.98 (13.71)	32.59 (20.19)	976.89 (89.98)
Waffle®	86.91 (16.59)	53.60 (21.71)	788.00 (71.92)

- The contact area was greater upon the Repose cushion (t=-9.00, df=8, p=0.000).
- This final result indicated that there was a lower peak interface pressure and greater envelopment of the body while subjects sat on the Repose cushion.

Figure 1 below shows typical pressure maps across the buttocks when seated upon the Repose or Waffle cushions.

Figure 1. Pressure distribution



Repose Waffle

Discussion

There were statistically significant differences between the two tested seat cushions with the peak pressure and gradient between the peak pressure and the adjacent sensor with the lowest applied pressure smaller when subjects sat upon the Repose cushion compared with the Waffle cushion. There was lower peak interface pressure and greater envelopment while subjects sat on the Repose cushion. The clinical significance of these results requires testing in an appropriately designed clinical study.

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