Heat Buildup Comparison of the EHOB® Cushion and a Leading Static Air Cushion

Background

As outlined by the NPUAP, the static air medium provides the most immersion for patients. Two of the static air cushion solutions for the United Kingdom are compared with respect to heat buildup. The NPUAP and EPUAP note that increasing evidence suggests that microclimate plays an important role in the development of pressure injuries. Heat buildup is undesirable because it is uncomfortable for the patient and can increase moisture concentrations. An increase in temperature and humidity can result in weakened skin that is at risk for injury.[1]

Testing is necessary to compare the heat buildup of a patient atop both cushions. An infrared camera is used to compare the average and peak (maximum) temperatures of a test subject after sitting an hour on each cushion. The infrared camera allows an entire area on a patient to be measured quickly without risk of capturing a single point (as when using a thermocouple or thermometer).

The product that helps most in heat dissipation will increase in temperature more slowly than the other. In other words, the average and peak temperatures will be lower on the product that helps most in heat dissipation.

EHOB Static Air Cushion

Purpose

The purpose of this test is to compare the heat buildup between the EHOB cushion and a leading static air cushion.

Method

1. Turned the laboratory hot plate to 95.5° F (35.3° C) and placed one layer of the Test Subject's shorts atop the hot plate for 5 minutes. Utilized WoundVision's award winning infrared camera, the Scout camera, to take a picture of the heat coming through the shorts from the hot plate and took the average temperature to be the reference temperature.

Note: Studies show that the human body begins to sweat above a skin temperature of 95.5° F (35.3° C) on average.[2] The baseline is therefore set to be the temperature of the heat coming through the shorts if the skin temperature was 95.5° F. Anything cooler is under the threshold of sweat production, and anything hotter is evidence of heat and moisture buildup.

2. Placed the test subject in thin, form fitting shorts and a thin shirt, after allowing the shorts to cool to room temperature.

3. Placed a black emitter atop the laboratory hot plate, and ensured the temperature of the emitter to be the baseline temperature – turned the hot plate setting to level 39 to keep the temperature of the emitter constant at the reference temperature.

Note: The Scout software must use a control temperature to compare relative differences in a captured image. The reference temperature used as a constant control value for every image captured.

Laboratory Hot Plate Scout Infrared Camera

4. Allowed the patient to acclimate to room temperature by standing without activity or sitting for 15 minutes in the testing room.

5. Utilized the Scout infrared imaging camera to establish a baseline temperature of the test subject's sacral area, using the emitter on the hot plate as the reference temperature. The average temperature of the sacral area is used as the baseline temperature.

6. Inflated a leading static air cushion to the recommended level, and sat the test subject on the cushion in a hospital day chair atop the cushion. Ensured the test subject did not shift or evacuate the chair for 1 hour.

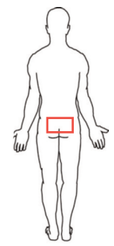
7. After 1 hour, allowed the test subject to stand, and immediately (in less than 3 seconds) captured an image of their sacral area with the Scout infrared camera, using the reference temperature as the control temperature.

8. Allowed the test subject to reach the baseline temperature (minimum 20 minute acclimatization period) and repeated steps 5-7 with the EHOB cushion.

EHOB Cushion atop Hospital Chair

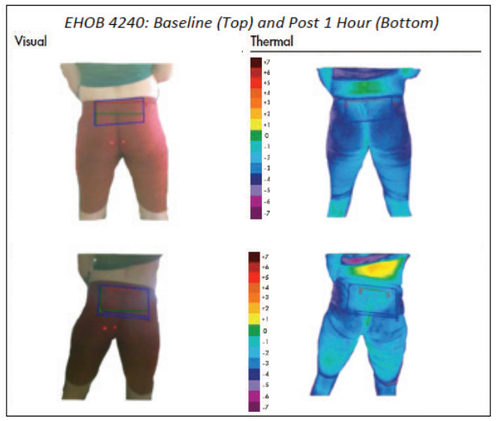
Results

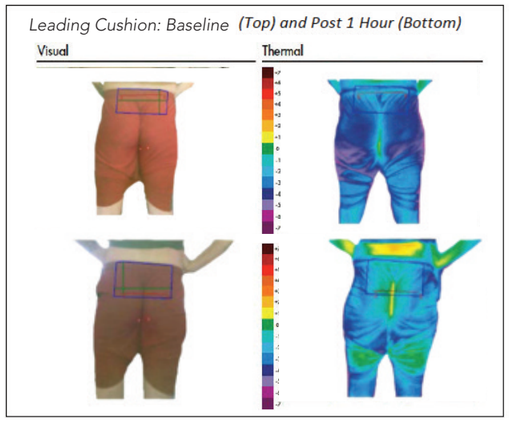
Diagram of Human Body with Area of Interest (Sacral Area) Highlighted in Red

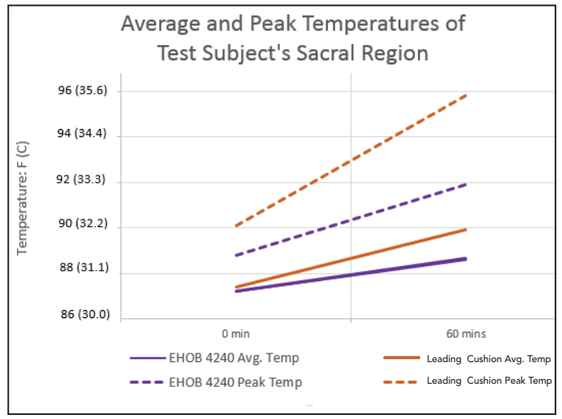


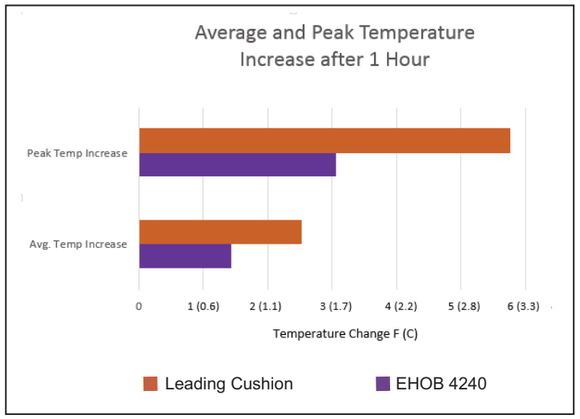
Fahrenheit (Celsius)	Reference/Control Temperature	Baseline Temp. Average	Baseline Temp. Peak	Post 1 Hour Average Sacral Temp.	Post 1 Hour Peak Sacral Temp.
EHOB Cushion	92.6 (33.7)	87.2 (30.7)	88.8 (31.6)	88.6 (31.5)	91.9 (33.3)
Leading Cushion	92.6 (33.7)	87.4 (30.8)	90.1 (32.3)	89.9 (32.2)	95.8 (35.4)

* Tolerance ± 1 F (± 0.6 C)









Synopsis and Conclusions

When using the leading static air cushion, the test subject heated up more quickly than when using the EHOB cushion.

The average temperature of the test subject increased 2.5 F (1.4 C) on the Leading Static Air Cushion vs 1.4 F (.8 C) on the EHOB Cushion. The peak temperature of the test subject increased 5.8 F (3.2 C) on the Leading Static Air Cushion vs 3.1 F (1.7 C) on the EHOB Cushion.

These test results show that the leading static air cushion retains more heat than the EHOB cushion. Facilities should test for themselves to see which cushion provides the best pressure ulcer prevention and treatment, which consists of pressure redistribution and microclimate management.

References:

1. National Pressure Ulcer Advisory Panel, European Pressure Ulcer Advisory Panel and Pan Pacific Pressure Injury \Alliance. Prevention and Treatment of Pressure Ulcers: Clinical Practice Guideline. Emily Haesler (Ed). Cambridge Media: Perth, Australia; 2014.
2. Charlie Lachenbruch, Ph.D. Microclimate Management – So Much More than Just Airflow. Hill-Rom Services, 2008.