Pressure Relief For Heels:
An Effective Innovation.

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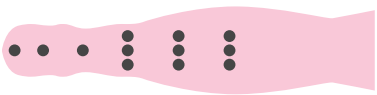
Introduction
Protecting the heels of patients who have to remain supine for long time periods is difficult, the heel support surface having been demonstrated as a zone of high interface pressure, resulting in pressure sores of all grades presenting at the heel.

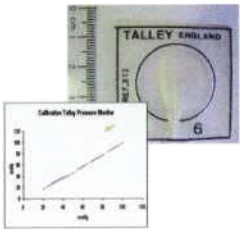
Aim
To investigate the interface pressure distribution across a new heel pressure reduction system.

Method
Four volunteers were asked to rest their leg on a normal hospital mattress and a new foot protector system (Repose Frontier Therapeutics) while supine. Interface pressure measurements were taken in twelve locations (Talley Oxford Pressure Monitor Fig 1) and three locations (Galtec Strain Gauge Fig 2) on the lower leg using two different interface pressure measurement systems. Dark field photography was used to examine the extent of heel contact (Fig 3).

Fig 1. Position of Talley Sensors.

Twelve Talley air filled sensors were applied to the lower leg of the volunteers in the position illustrated below.

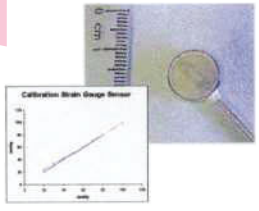




Calibration curves for Oxford Talley sensors.

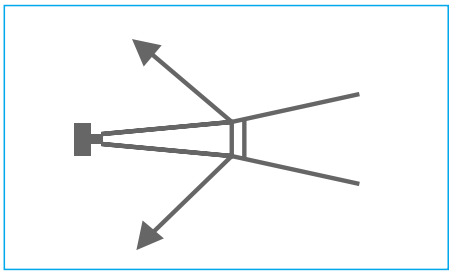
Fig 2. Position of Galtec Sensors.

Three 13mm strain gauge sensors were applied to the lower leg of the volunteers in the positions illustrated below.

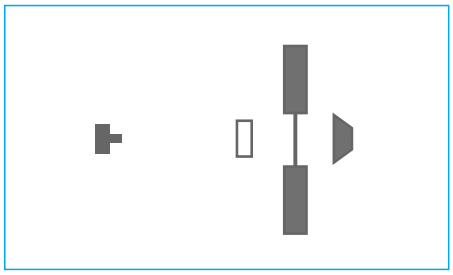


Calibration curves for Galtec sensors.

Fig 3. Dark Field Photography.



Translucent objects photographed with normal lighting provide no distinct edge effect, resulting in poor definition due to the large family of angles for the reflected lighting.



To eliminate this large family of angles of reflected light the use of dark fields and background translucent lighting can be used. The general terminology given to this method is dark field photography in this case the dark fields are placed either side of the object (light field).

Results

Interface pressure readings from the Talley system demonstrated the median (range) interface pressures observed on the hospital mattress for five consecutive measurements at the heel were 162.5 (126-213)mmHg and the median maximum pressure for five consecutive measurements from the sensors for the rest of the lower leg was 24 (16-28)mmHg. For the foot protector placed on the mattress the heel pressure was reduced to 8.5 (6-26)mmHg with no major increases seen on any other location on the lower leg, 25 (19-25). Residual pressures were present when the heel was off-loaded due to the curvature of the Talley sensor over the heel region.

Interface pressure readings for the Galtec sensors demonstrated pressures on the hospital mattress for five consecutive measurements were, heel *(115-300+)mmHg and the maximum pressure range for five consecutive measurements from the other two sensors was **(0-30)mmHg. For the foot protector placed on the mattress the heel pressure was reduced to 0 (0-0) mmHg, complete off-loading being demonstrated, with no major increases seen at the other two locations on the lower leg **(0-50)mmHg.

Dark field photography demonstrated a clear air space under the heel when the foot was placed in the foot protector for all of the volunteers.

**No median as maximum sensor pressures exceeded. ** Median not used two sensors only*

Dark field photograph of volunteers leg positioned in the foot protector with a clearly seen air gap under the heel area.

Conclusion

The foot protector investigated in this study drastically reduces the interface pressure under the heel without putting other areas of the lower leg at risk.