Preventing Pressure Ulcers: Using Technology to Study Heel Immobility and Blood Flow

S. Bennett, R. Goubran and F. Knoefel

BACKGROUND

Pressure ulcers are of growing concern to healthcare systems. The National Patient Care Safety Monitoring Study found that 4.5 % of patients develop pressure ulcers during a hospital stay.

Pressure ulcers are associated with increased in-hospital mortality, increased 30-day mortality, increased risk of 30 day readmission and a doubled hospital stay.

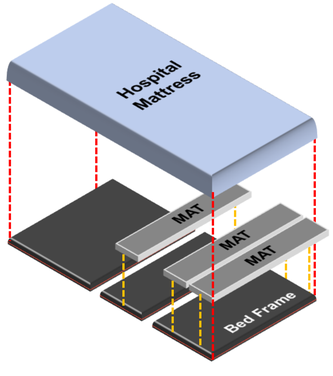
Considering the growing incidence of pressure ulcers and the unobtrusiveness of required equipment, this study may yield important results for little risk.

METHODS

Two types of technology are being used to gather patient data.

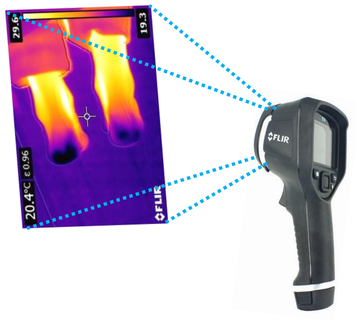
1. PRESSURE SENSORS

Pressure mats were installed on a hospital bed to collect information on patient lower limb mobility.



2. THERMAL SENSORS

Thermal images of the heels and lateral malleoli are captured regularly to collect information on temperature distribution.



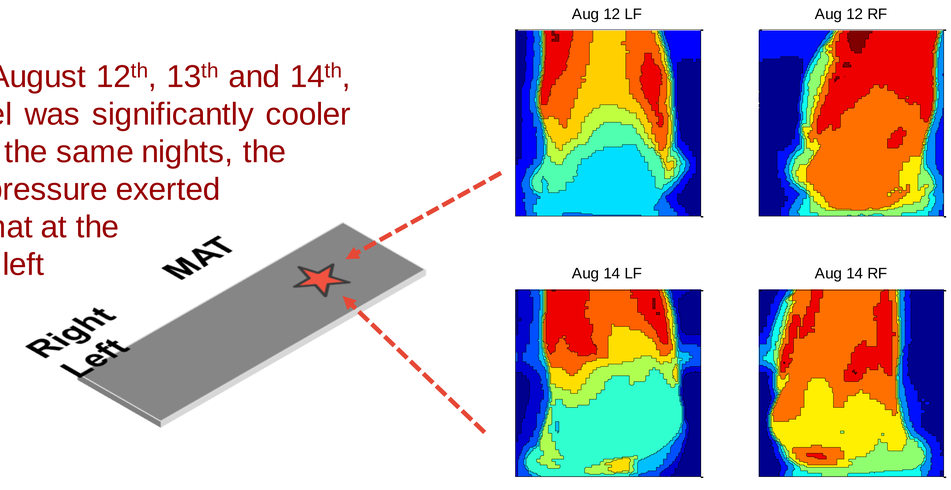
OBJECTIVES

- Advance the understanding of the roles of immobility and vascular changes in the development of lower limb pressure ulcers in Complex Continuing Care.
- This will be done using two different sensor technologies; pressure sensitive mats and infrared thermal cameras.

PRELIMINARY RESULTS

Using technology to understand immobility and vascular changes in the feet means determining relationships between patterns seen in pressure or thermal data and patient outcomes. This also means establishing relationships between thermal data and pressure data. Preliminary results suggest ***there IS a relationship*** between pressure exerted by the feet in-bed and the temperature distribution of the heels.

On the nights of August 12th, 13th and 14th, 2015, the left heel was significantly cooler than the right. On the same nights, the highest average pressure exerted on the pressure mat at the Heels was on the left side (indicated a red star).



NEXT STEPS

Following data collection, we will complete extensive data analysis to identify pressure and thermal patterns that describe changes in heel mobility and blood flow. Once we identify these patterns, we will explore possible preventative interventions.

KEY TAKEAWAY

Ambient sensor systems can provide health information about older adult mobility and blood flow that may be able to help prevent the development of pressure ulcers, therefore preventing hospitalization and saving lives.