Utility of Thermal Imaging to Evaluate Sacral Skin Blood Perfusion Status of ICU Patients

PURPOSE: Hospital-acquired pressure ulcers (HAPU) result in about 2.5 million patients in acute-care hospitals treated for HAPU annually. Although it is assumed that patients with vascular deficits entering an ICU are at increased risk for HAPU there is no validated quantitative method in which ICU patients can be rapidly and efficiently screened to determine which are more likely to develop a HAPU. Our specific aim was to determine the utility of a new commercial infrared thermal imaging system to discriminate at-risk levels of ICU patients from skin temperature differences between pressure ulcer prone sites (sacrum) and remote not-at-risk control skin sites.

METHODS: Buttocks and lower back areas of 100 ICU patients were imaged to obtain simultaneous infrared thermal and standard photographic images. Images were analyzed by comparing temperature differentials between sacrum and a distant control skin site within the image. A decreased perfusion leading to an increased breakdown risk threshold (RISK-T) was defined if sacral temperature was 1.5°C less than the control site. This threshold was based on prior data for sacrum showing it to normally be 0.75°C less the lower back. The underlying hypothesis was that patients with vascular disease would be more likely to exceed RISK-T than patients not so diagnosed.

RESULTS: Of 100 patients imaged, 68 had vascular disease (VASD) consisting of peripheral (PAD) and/or coronary (CAD). Of these, 14/68 (20.6%) exceeded ART whereas for patients without diagnosed VASD (NO-VASD), 6/32 (18.8%) exceeded ART. Chi square analysis of these proportions show no significant difference between VASD and NO-VASD patients with respect to exceeding the thermal differential threshold.

CONCLUSIONS: Although infrared thermal screening may provide visually impressive and potentially useful images in some cases, the use of temperature differentials to detect patients at particularly high risk related to vascular status is not supported by the present results.