Skin Pigmentation Impacts the Clinical Diagnosis of Wound Infection: Imaging of Bacterial Burden to Overcome Diagnostic Limitations, Johnson et. al. *Journal of Racial and Ethnic Health Disparities*, Volume 10, Issue 2, April 11th 2023

Level of Evidence: 2

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Often times healthcare clinicians are not provided with educational material on wound care and skin tone. This can create disparities in treatment and management of wounds in patients with darker skin tones. The authors believe that clinical indicators of infection are also more likely to be unrecognized on highly pigmented skin, potentially leading to delayed or missed diagnoses.

The purpose of this study was to assess how perception of clinical signs and symptoms (CSS) of infection can differ by patient skin tone, and if fluorescence imaging (FL) can offer a more objective diagnostic solution. The authors analyzed 350 chronic wounds post hoc from a single blinded, multicenter, prospective clinical trial. The participants were 350 adults (225 male and 125 female) with an average age of 60 years old (range 28-96 years). Participants were included if they presented to one of 14 US outpatient advanced wound centers between May of 2018 and April 2019. Wounds were of unknown infection status and analyzed by experienced wound care clinicians.
The Fitzpatrick Skin Phototype Classification (FSPC) was used to classify skin types in terms of amount of pigment in the skin. Participants were grouped into low (FSPC score 1-2), medium (FSPC score 3-4), and high (FSPC score 5-6). Wounds were considered positive for CSS based on the detection of greater than or equal to 3 International Wound Infection Institute (IWII) criteria. Sensitivity of CSS, FL, and CSS +FL to detect high bacterial load was assessed in each of the FSPC groups. High bacterial load was defined as $> 10^4$ CFU/g.

The results showed that bacterial load was not significantly different among the three FSPC groups. There was a near statistically significant difference (.051) noted in the frequency of erythema between FSPC groups. There was a statistically significant difference noted in wound breakdown and enlargement and delayed healing beyond expectation between all three groups, with the high FSPC group having the worst in both cases. CSS sensitivity in detecting high bacterial load was the lowest in the high FSPC group (2.9%) in comparison to the medium (24.3%) and low FSPC (14%) groups. With the addition of FL, the sensitivities improved with high levels of statistical significance, with a 12 fold increase in the high FSPC group. FL detection of high bacterial load alone was similar to that of CSS + FL.

Since the FL imaging device can objectively measure pathogenic levels of bacteria without influence of skin tone, the authors suggest incorporation of FL imaging devices to better detect bacterial load and prevent infection in patients with highly pigmented skin.
