3D Plotting of Wound Photos Inaccuracy

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Introduction

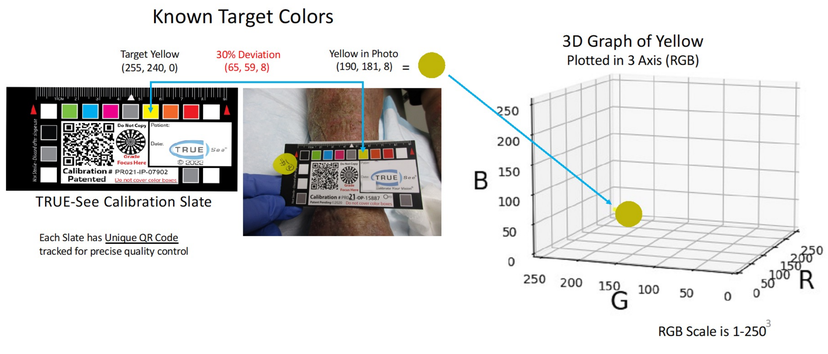
- Wound healing is a continuum, and wounds often contain a mixture of tissue types with various colors.
- Medical photos are used in the assessment, documentation and treatment of wounds.[1,2]
- Inconsistencies in technique and technical variability of photographic devices cause substantial color errors that misrepresent clinical observation,[2,3,4] decrease quality of documentation,1 cause delays in diagnosis,[5,6] and improper conclusions.[3,7]

Objective

- This research, from a database of 50,900 photos taken at 14 facilities (inpatient and outpatient) in the US 12/1/21 – 12/15/23, identifies the discernible visual inaccuracy in color and potential clinical confusion caused by inaccurate photo colors in assessment of different tissue types.

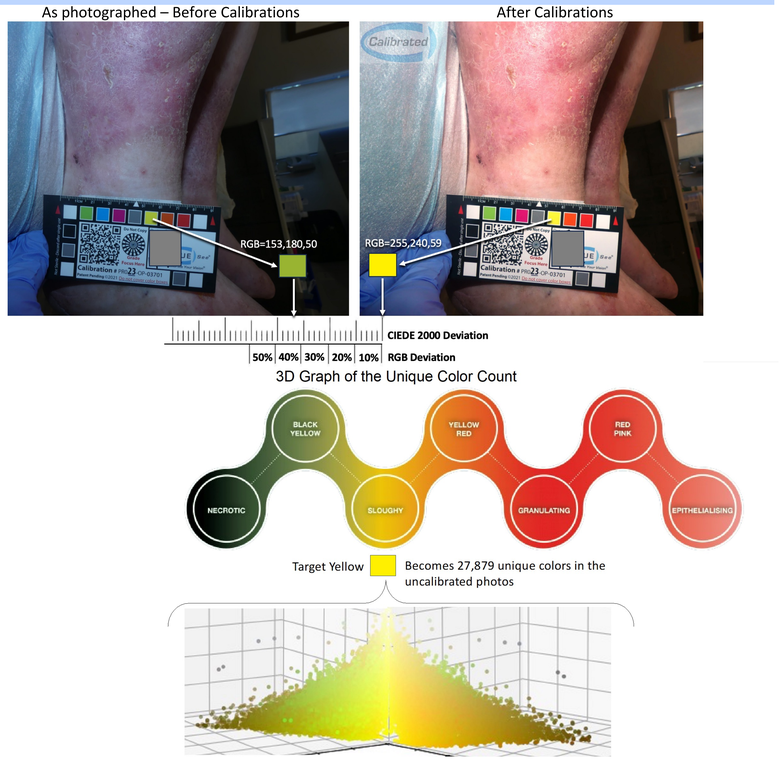
Methods

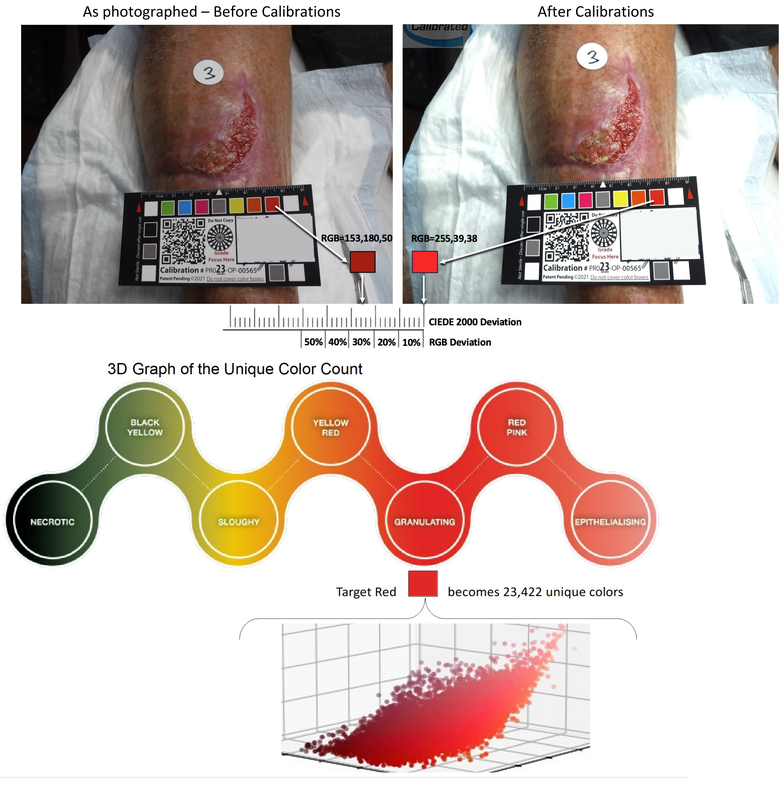
- A color chart with a tracking number was placed into the photo field. Studies have shown that a color chart in the photo can be used to measure color accuracy.[3]
- The color chart contains known target colors that are measured using the Red, Green and Blue (RGB) color system.
- The database was searched for the clinically relevant colors, Black, Yellow, and Red, on the Wound Healing Continuum.[8]



- Color calibration software was used to detect the color chart and calculate the RGB color detected.
- Each color was 3-dimensionally plotted.

Results





Conclusions

- The color chart, RGB measurement and 3-dimensional RGB plotting identified significant color variation for Black, Yellow and Red.
- The discernible difference for Yellow and Red appear to have the greatest probability of clinical confusion of tissue types based on color inaccuracy.
- Black had high variability; however, the clinical impact would appear to be less confusing.
- Color inaccuracy makes precise, verifiable color calibration necessary for photos to properly represent the live observed wound.[4]
- While a paradigm for assessing medical image color quality as well as technical and technique standards are not fully evolved,[1,2,3] this research documents the importance of accurate color and the potential clinical impact.

Future Studies

- The study can be repeated with additional colors on the slate, different wound types, and skin colors to identify which are most problematic for clinicians and have the greatest risk of misinterpretation and or diagnostic error.
- Additional models of analysis such as CIEDE2000 Color Deviation will help measure the color differences and develop a color correctness or confidence score of the photos.
- Inter-rater reliability studies can then be used to validate the data.

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