The purpose of this study was to compare the reliability of wound surface area measurement techniques using actual human wounds and to determine the reliability of novice raters using newer measurement technologies.

**METHOD:**

**DESIGN & SUBJECTS:**

The design was a parallel group design involving novice and expert clinicians measuring 21 open wounds (16 males, 5 females; 53-95 years of age). The majority of wounds were venous leg ulcers (20); one was a vasculitic ulcer. Mean duration of the wounds was 13 months; surface area ranged from 0.43 cm² to 15.25 cm².

**PROCEDURE:**

Novice raters used a smartphone app (Tissue Analytics) and a laser-guided planimetry device (ARANZ Medical, SilhouetteStar®). On the same date, expert raters used a traditional (linear) method of greatest length by hand-held camera. The clinician traced the wound perimeter using a digital stylus. The associated software calculated the L, W, and SA. For the smartphone app, the image was captured using a hand-held camera and uploaded to a computer. The clinician traced the wound perimeter using a digital stylus. The associated software calculated the L, W, and SA.

**DATA ANALYSIS:**

SPSS, version 22, was used to determine intraclass correlation coefficients (ICC) for intra- and inter-rater reliability. SA calculations and raw LxW calculations were compared between methods.

**RESULTS:**

Intra-rater reliability, ICC(3,1), of novice SA measurements was excellent, .944 with the app and .998 with the laser-guided device. Inter-rater reliability for each method, using LxW and the calculated SA, was also excellent (Table 1).

Regardless of wound size, there was close agreement between methods for the LxW calculation across nearly all subjects. Note slightly more discrepancy was observed with the app and larger wounds (Figures 4 & 5).

**DISCUSSION:**

Novice raters using newer measurement technologies achieved comparable reliability with experts using the traditional linear method. Consistent with the literature, the linear method tended to overestimate wound size when compared to SA calculated by the app. Lighting, wound position and image quality may affect reliability of computerized methods which do not involve human identification of the wound margin. While no gold standard exists, all methods were found to have excellent reliability; laser-guided planimetry having the highest reliability. Selecting one consistent method is recommended to reliably document wound measurements.

**BACKGROUND:**

Reliable wound measurement is essential to establish a baseline and track healing progress. Several techniques exist for measuring wound surface area (SA), however, they have various levels of reliability and accuracy. The most commonly used and traditional linear method, multiplying length by width (LxW), has been shown to over-estimate wound size by an average of 41% (Rogers, 2010).

Newer technologies, including the use of photo-planimetry software and smartphone applications, calculate SA by identification of the area within the wound perimeter. These methods offer the potential for non-contact measurement, greater accuracy, efficiency and enhanced clinical documentation. However, reports indicate variations in lighting, angle, clinician training, edge identification, tissue contour and wound size may impact precision and reliability. Few studies compared these measurement techniques using actual human wounds. Currently, no gold standard exists.

**PURPOSE:**

The purpose of this study was to compare the reliability of three different wound surface area measurement methods and to determine the reliability of novice raters using the smartphone application (app) and laser-guided planimetry methods.

**CONCLUSION:**

Excellent reliability was observed between methods using the LxW calculation (Table 2). Regardless of wound size, there was close agreement between methods for the LxW calculation across nearly all subjects. Note slightly more discrepancy was observed with the app and larger wounds (Figures 4 & 5).

**FIGURES & TABLES:**

- Table 1. Inter-rater reliability of all 3 methods.
- Table 2. Comparison of LxW between methods.

**REFERENCES:**

Consistent with the literature, the linear method tended to overestimate wound size when compared to SA calculated by the app. Lighting, wound positioning and image quality may affect reliability of computerized methods which do not involve human identification of the wound margin. While no gold standard exists, all methods were found to have excellent reliability; laser-guided planimetry having the highest reliability. Selecting one consistent method is recommended to reliably document wound measurements.