

Accuracy and Reliability of Wound Areas and Perimeters Measured from Digital Images using Computerized Planimetry

Background: Tracking wound 'size' is an essential part of treatment. Because a wound's initial size affects apparent healing rates, its surface area (S) to perimeter (P) ratio (S/P) is useful to document healing. Changes in S/P provide a quantitative index of movement of a healing wound's margin toward the center or away if the wound is growing. Assessments can be done using computerized planimetry whereby a wound's margin is outlined on a computer screen and the perimeter and enclosed area are automatically determined by easy to use and readily affordable software*. Because wounds are sometimes treated and evaluated by different caregivers and because measurement-time is a consideration, it is important to have an estimate of accuracy, reliability and measurement-time with which S and S/P can be routinely determined.

Purpose: To determine accuracy, reliability and measurement-time of S and S/P when images recorded by digital photography were measured by 4th year student nurses.

Methods: Six images of various complexities having areas known to within $\pm 0.1\text{cm}^2$ were measured in triplicate by 20 students during two sessions one week apart. Images included; an ellipse (84cm^2), two traced venous ulcers (87cm^2), a pressure ulcer (82cm^2), plantar ulcer (6.5cm^2) and venous ulcer (41cm^2). Area error was determined as the percentage difference between known and planimetry measured areas. Reliability was assessed from coefficient of variations (CV%) calculated from standard deviations (sd) of differences between the two measurement sessions.

Results: Area error (mean \pm sd) ranged from $-3.8\pm 7.0\%$ to $+2.4\pm 2.2\%$. CV% was 0.85 to 8.45% for areas and 0.89 to 6.04% for S/P. The smallest wound (plantar) had the largest variance mainly due to variability in defining its margin. Average wound measurement-time was 81.0 ± 10.5 seconds.

Conclusions: Results suggest that simple computer-based planimetry of digital images can provide rapid, accurate and reliable estimates of wound area and S/P ratios.

*www.clinsoft.org

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