## Documenting Wound Areas via Digital Photography: Effect of Camera Angle on Area Accuracy

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## **Objectives:**

(1) To describe and illustrate potential errors of using digital photography to assess wound areas

(2) To describe appropriate procedures to eliminate or substantially reduce these errors

## ABSTRACT

**Problem Statement:** A useful method to document and track a wound's progress is via digital photography. Resultant photos can be used as reference and, via planimetry of digitized photographs, yield quantitative assessments of area changes. However, without care, this method can result in large apparent and absolute errors.

**Rationale:** One important potential error source relates to the angle ( $\theta$ ) between the camera's line-of-sight and wound plane. We sought to mathematically and experimentally estimate this area error. Our goal is to describe and illustrate potential errors of using digital photography to assess wound areas and to describe appropriate procedures to eliminate or substantially reduce these errors

**Methods:** Shapes of known area, and shapes resembling complex wounds, were photographed with a digital camera at various angles. Photographs included horizontal and vertical scales for calibration. Areas were estimated by tracing the perimeter of the digitized image shape using computerized planimetry.

**Results**: Mathematical analysis predicted shortening of the shape's width in proportion to  $\sin\theta$ .

For example, in comparison to a photo taken at  $\theta$ =90° (pointing directly down to the wound), a photo taken at 30° has a projected width that is ½ of the true dimension. This results in an area estimate that is ½ of the actual wound area. The predicted area errors for various angles were confirmed by measurements of various shapes.

**Conclusions:** The intrinsic potential error described can be overcome in two ways. (1) Take wound photos as close to 90° as possible – this yields no angular area error and a horizontal calibration is sufficient. (2) If this is not possible, and the photographic angle is less than 75°, then calibrating the image in both dimensions will eliminate most of the angular area error. This requires that calibration scales in both directions are included in the wound photograph.

## **References:**

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