Chapter 3

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3.1 Wound Assessment

The pace of change in wound management is placing an emphasis on the development of more objective tools by which to assess and evaluate wound healing. At present, there are no predictive factors to guide clinicians to differentiate patients who will heal readily from those who will have prolonged courses of treatment[110].

3.2 Importance of Wound Measurement

Recording wound area and volume is considered a routine part of patient assessment and provides information on the progress of healing[111]. A thorough initial wound assessment provides baseline data about the status of the wound and valuable information that can assist in identifying short- and long-term goals of care and help to determine appropriate interventions at each stage[112].

Accurate wound measurement is an integral and objective component of the assessment process and is required for comparative results and analysis of treatment regimens[113]. However, in two studies of documentation of wound assessment, statements such as ‘healing well’ were commonly used whereas actual wound size was only recorded in six out of 40 patients’ notes with the method of wound measurement never mentioned[114, 115].

Being able to predict whether wounds will heal readily with conventional

treatment and deciding which patients are candidates for often expensive new treatments isimportant[114, 116]. Continuous monitoring of changes in wound size is key to the outcome of this process. Knowing which ulcer will probably fail to heal within a 24-week period allows the clinician to consider alternative and perhaps more aggressive treatment strategies after only four weeks of therapy, using simple measurements accessible to any practitioner[116].

The value of knowing wound size is demonstrated by Margolis et al.[116]. In a retrospective cohort study of 260 patients they were able to predict ulcer healing in venous leg ulcers at 24 weeks in 95% of cases when compression therapy was used. To predict this outcome they devised a scoring system. This system allocated one point to wounds greater than 5 cm^2 and one point to those greater than 6 months in duration. A total of 93–95% of whose with a score of 0 healed at 24 weeks compared with 13–37% of those with a score of two.

Predicting ulcer healing is especially important in the current managed care environment in which cost-containment and the need for referral to a specialist have assumed great importance[117]. If further referral and investigation are warranted then the measured ulcer area is an important piece of medical information[118].

3.3 Wound Measurement Methods

Methods used to determine the area of a wound can be subdivided into contact and non-contact methods. Of the methods listed in Table 2, ruler technique, tracing overlays and planimetry are most commonly used in routine clinical practice[118].

3.3.1 Ruler Method

The ruler method measures the maximal length by the maximal perpendicular width using a disposable paper ruler to calculate area.

The ruler method is the simplest method for measuring the sizes of skin lesions and determines their area through a manual measurement of their length and width (L x W) with a ruler or tape measure. A number of different measurement strategies can be used for the L x W method, including the longest head-to-toe length and longest perpendicular width of a lesion; the longest length and width perpendicular to one another; the longest head-to-toe length and greatest width at any angle; and the longest length and greatest width at any angle. A study done by Langemo et al.[119]. demonstrated that measurement of the longest head-to-toe length and greatest perpendicular width of a lesion was the most accurate method for all of the three wound shapes (symmetrical, L-shaped, and pear-shaped) in the study. However, although it is simple to use and inexpensive to implement, the RT method is accurate mathematically only for rectangular or square lesions. Consequently, the more the shape of a lesion deviates from a rectangle or square, the greater is the potential for overestimation of its true surface area

3.3.2 Acetate Method

The acetate method involves applying a two-layer transparent acetate over the wound and tracing the perimeter with a permanent pen. The contact layer is then discarded into clinical waste and the top layer stored within the patient notes. For most cutaneous lesions, measuring the wound area from contour tracings estimates healing reliably despite the errors introduced by flattening a curvedsurface[120].

Most acetates are provided preprinted with 1 cm^2 measures, and the number of

squares half or more within the perimeter are calculated as 1 cm^2. Some acetates are preprinted in 1 mm^2 areas but these take too long to count and are not suited to routine practice. In addition to providing an area outline of the wound, the acetate can be used to identify areas of slough or epithelialisation and can be dated and stored within patient notes. Computerised systems, such as digital planimetry, can be used in conjunction with acetate[121].

3.3.3 Digital Planimetry

Digital planimetry incorporates the same method to obtain the wound border as the acetate method, but rather than counting squares the tracing is placed on a digital tablet, and the border is re-traced using a stylus. The underlying sensor then calculates the wound area. The literature reports some studies that have compared methods to obtain wound area for superficial wounds. Oien et al.[122] compared the measurement of 50 leg ulcers in 20 patients by three physical therapists using four methods of area measurement: maximal perpendicular diameter; grid tracing and square counting; mechanical planimetry; and digital planimetry. The results demonstrated that all four methods had a high degree of agreement with each other, at least for ulcers with an area up to approximately 10 cm^2.

3.3.4 Photographic Method

At each ulcer measurement session, three photographs were taken using 35-mm color slide film* and an OlympusOM-2s camera. A metric ruler wastaped adjacent to and in the plane of the ulcer prior to photography. The distance between ulcer and camera was 27.9 to 30.5 cm (11-12 in). To obtain a tracing from each slide, the slide was projected onto paper, and the projector-to-paper distance and focus were adjusted until the image of the metric ruler in the slide exactly matched the ruler used in the original photograph, as described by

Bulstrode et al.[123]. The ulcer margins were then traced with a pen. One tracing was generated from each of the three slides for each measurement session of each individual ulcer.

3.3.5 Wound Depth

(a) Depth Gauge

Internal wound dimensions are commonly measured by placing a depth gauge at the “deepest” aspect of the wound[6] Use of a depth gauge leaves considerable room for measurement error because the value obtained from each measurement depends on the technician's determination of the “deepest” portion of the wound[124].

(b) Dental Impression Material or Saline Method

A technique that has been used clinically to assess wound volume involves filling the wound cavity with a substance such as alginate. A mold is made of the wound, and either the volume of the alginate cast can be measured directly with the use of a fluid displacement technique or the cast can be weighed and that weight divided by the density of the casting materials, which represents the wound volume. A variation of this technique for measuring wound volumes involves using saline. A quantity of saline is injected into the wound; the volume of fluid needed to fill the wound is recorded as the volume of the wound. These techniques have been described in various articles in the literature, and the relative merits and relative accuracy of each have been the subject of several studies reported in the literature[125].