p-ISSN 2582-1407, e-ISSN 2582-3426
Original Article

RFP Journal of Gerontology and Geriatric Nursing
Volume 5 Number 2, July - December 2022
DOI: https://dx.doi.org/10.21088/jggn.2582.1407.5222.1

Role of Digital Planimetry in Wound Management

Gnaneshvar Manivannan[1], Neljo Thomas[2], Ravi Kumar Chittoria[3]

How to cite this article:
Gnaneshvar Manivannan, Neljo Thomas, Ravi Kumar Chittoria/Role of Digital Planimetry in Wound Management/RFP Journal of Gerontology and Geriatric Nursing. 2022; 5 (2): 41–43.

Abstract

Wound measurement and keeping track of wound healing are considered a routine part of wound management. Wound measurement is a non-standardized, variable process that can introduce errors by as much as 40%[1] and suffers from inconsistency. Even with considerable advances in technology, wound measurement in clinical practice today is still mostly a manual process with wounds most often measured using rulers and probes that while simple is not accurate, consistent or efficient, and often carry the risk of infection. In this article, we will discuss the role of Digital Planimetry in wound measurement.

Keywords: Digital Planimetry; Wounds; Assessment.

INTRODUCTION

The measurement of the size of the wound helps in deciding the further course of management of wounds. It was shown that change of wound surface area over time is a good predictor of wound healing and in the treatment of patients with diabetic foot ulceration, there is a recommendation to re-evaluate the clinical procedures if the wound does not reduce its area by more than 40% in 4 weeks.[2] In wound cases,the ultimate goal is to prevent infections and other complications and also to hasten wound healing. It is important to understand the pathological process of wound development in the patient for planning the treatment for the specific wounds. The detailed clinical examination should include history and duration of ulcer, associated comorbidities, examination of the ulcer along with the specific radiological investigations of the patient. There are various methods by which wounds can be measured like a photographic record, comparison, ruler method, graph method, and digital planimetry. In this article, we will assess the usefulness of Digital Planimetry (Fig. 1) in measuring the area of the wounds.

Author's Affiliation: [1]Junior Resident, Department of General Surgery, [2]Senior Resident, Department of Plastic Surgery, [3]Professor & Head of IT Wing and Telemedicine, Jawaharlal Institute of Postgraduate Medical Education and Research Pondicherry 605006, India.

Corresponding Author: Ravi Kumar Chittoria, Professor & Head of IT Wing and Telemedicine, Jawaharlal Institute of Postgraduate Medical Education and Research Pondicherry 605006, India.

E-mail: drchittoria@yahoo.com

Received on: 11.07.2022 **Accepted on:** 25.08.2022

Fig. 1: Digital Planimetry for wound measurement

MATERIALS AND METHODS

This is a case report of the use of digital planimetry in a venous ulcer wound. This study was conducted in a tertiary care hospital in 2022. The Patient was 50 years female who presented with an ulcer on her left leg for five years. The ulcer was 18 x 10 cm, with, the floor was covered with necrotic tissue. There was no history of any co-morbidity. The patient was thoroughly investigated, and it was found that the patient had an incompetent venous perforator in the middle third of the leg. The method of wound area measurement using Digital Planimetry is easy to perform and inexpensive. The wound is photographed with a ruler or a marker grid (Fig. 1) of known dimensions placed at the skin near the wound edge and the image is transferred to a computer and opened in planimetric software (ImageJ software).

Step 1: The wound was cleaned to define the surroundings.

Step 2: A sterilized grid of a 4×4 cm area was kept along the side ofthe wound.

Step 3: Good quality photograph was taken and saved to thecomputer. The photograph was analysed using ImageJ free opensource software.

Step 4: The edges of the wound were marked and the area wascalculated. As the area of the grid known i.e., 16cm^2 the numberof pixels falling under the square marked and marked wound wascalculatedArea of wound=16 (wound measurement/grid measurement)^3 (Fig. 2)

Fig. 2: Digital Planimetry software calculating the surface area of the wound

RESULTS

The ruler method which is routinely used in clinical practice was highly inaccurate and overestimated the wound size by nearly 50%. However Digital planimetryremained consistent and accurate with the percentage of over or underestimation being 2-4% in comparison with it.

DISCUSSION

The results of the current study indicate that the use of digital planimetry efficiently improves the accuracy and precision of area measurement. The use of digital planimetry remarkably reduces the variation of area measurement by averaging the number of pixels per 1 cm from two sides of the measured wound. A square paper marker placed near the wound and photographed with it was used by Shetty et al[6] for calibration in wound area measurement. They proposed using the number of pixels per 1 cm^2 for calibration, which could be determined from the number of pixels in the 16 cm^2 square. Unfortunately, the use of only one square marker at one side of the wound is almost the same as using one ruler for calibration at one side. Two squares placed at opposite sides of the wound would help much more, but they did not suggest such a technique. The technique with one square marker was not compared with the standard technique based on one ruler commonly used for calibration and the possible superiority of calibration with a square marker was not confirmed. Based on the results of the current study one can conclude that digital planimetrywill be the best method, of all presented in this study, for small wounds and for wounds placed in skin regions with low curvature. The other methods presented here will have better accuracy on curved skin, but they are also not suitable for all cases. There are regions of skin where the wound area measurement is always problematic. For example, a large wound around the heel will cause problems, because the transparent film used in the Visitrak device and in the area me method will not cover properly such a region and the wound tracing will be made with errors. Measurement at heal with the Silhouette Mobile device will be also problematic as it requires some region of healthy skin in order to properly compensate for the skin curvature. Every non-3D method in such a region will measure the area with a certain approximation.

CONCLUSION

Digital planimetry appears to be appropriate means of obtaining accurate surface area measurements. Digital planimetry is a quick and practical method and could therefore be recommended in the clinical setting.

REFERENCES

1. Rogers LC, Bevilacqua NJ, Armstrong DG, Andros G. Digital planimetry results in more accurate wound measurements: a comparison to standard ruler measurements. J Diabetes Sci Technol. 2010 Jul 1;4(4):799-802.
2. Steed DL, Attinger C, Colaizzi T, Crossland M, Franz M, Harkless L, Johnson A, Moosa H, Robson M, Serena T, Sheehan P, Veves A, Wiersma-Bryant L. Guidelines for the treatment of diabetic ulcers. Wound Repair Regen. 2006 Nov-Dec;14(6):680-92.
3. Gilman T. A multicentre study of percentage change in venous leg ulcer area as a prognostic index of healing at 24 weeks. Br J Dermatol. 2003 Oct;149(4):896-7; author reply 897-8.
4. Lavery LA, Barnes SA, Keith MS, Seaman JW Jr, Armstrong DG. Prediction of healing for postoperative diabetic foot wounds based on early wound area progression. Diabetes Care. 2008 Jan;31(1):26-9.
5. Wunderlich RP, Peters EJ, Armstrong DG, Lavery LA. Reliability of digital videometry and acetate tracing in measuring the surface area of cutaneous wounds. Diabetes Res ClinPract. 2000 Aug;49(2-3): 87-92.
6. Shetty R, Sreekar H, Lamba S, Gupta AK. A novel and accurate technique of photographic wound measurement. Indian J PlastSurg 2012; 45:425–9.