

Best practice for capturing and presenting accurate wound images

KEY WORDS

- » 2D/3D
- » Image
- » Photography
- » Presentation
- » Research
- » Wound assessment

Wound photography can enhance patient and wound assessment when delivered in a manner where images are clear and consistent. Furthermore, when used appropriately, images can influence decision making in treatment planning for a patient. Photography within a clinical research environment also offers the opportunity to map a wound to assess a treatments efficacy and benefits. This article by a senior photographer helps wound care professionals take high-quality images of wounds. By following his simple guidelines even the unskilled photographer can achieve clear, crisp wound images.

Wound condition and research outcome can only be demonstrated if captured and presented accurately, this article highlights best wound imaging practice, with a view to avoiding those inconsistencies regularly observed when wound care professionals present or publish their work.

Consistent image capture and standardisation techniques, in conjunction with presentation image alignment and scaling are demonstrated in a practical and simplistic fashion, so allowing all to reveal their work in the clearest possible fashion.

Prior to reviewing this article or capturing any clinical images, consider where the images will be stored and how they will be used in the short and long-term:

- » Mobile capture devices such as phones are not recommended, their convenience is off-set by a lack of image quality and security; devices are easily misplaced, are subject to auto back-up and operate outside the controlled hospital networks
- » Image storage should always conform with local hospital guidance, if in doubt contact your Medical Illustration Department. Ensure all applicable image details, including the level of consent, are associated with the images — databases, departments and staff change but the images will remain
- » Consent to images should be documented and evidence retained with the resultant images. The level of consent must reflect the intended uses for the life-time of those images, otherwise re-consent accordingly. Note, if images are published on-line it is impossible to fully control

image circulation thereafter — if applicable, patients must be informed of this prior to consenting.

IMPORTANCE OF IMAGES

This article does not list high-end imaging techniques or demonstrate the latest PowerPoint (PP) wizardry. Its goal is to provide practical entry and intermediate level guidance — or a pause for thought — to anyone in a clinical environment who is capturing or presenting dermatological wound images.

The perceived quality and accuracy of a presented image — or sequence of wound images — instantly conveys a message to the viewer:

- » The content of each image will convey a direct message to each observer — irrespective of the accompanying dialogue, text or graph. Check the context to ensure that the image content being discussed is clearly captured, presented and pertinent. *Figure 1* shows how differently a wound can be captured and incorporated to add visual impact and detail.
- » Image quality (or lack of) will determine how much confidence the viewer will attribute to that image or the conclusion(s) drawn from it. *Figure 2* demonstrates how incorrectly captured images from the SSG donor site (*Figure 1*) convey a different message.

ACCURACY AT THE POINT OF CAPTURE IS BEST PRACTICE

Time will be saved, if spent considering the subject position, angle of capture, inclusion of

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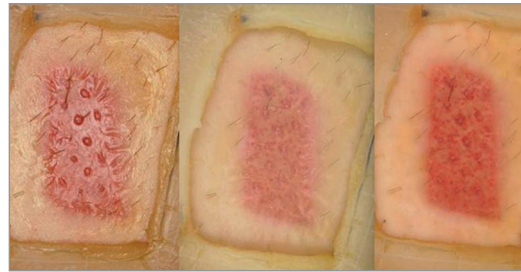


Figure 1. SSG donor site L-R; specular, diffuse and cross-polarised lighting clearly identify surface texture, tissue types and colour only respectively



Figure 2. SSG donor site specular lighting L-R; out of focus, over exposed, wrong colour balance

scale and lighting settings, otherwise this time will only be spent correcting images in Photoshop or PowerPoint later.

In short, if all images are captured accurately, then any wound sequence will also be consistent and clearly demonstrate the treatment outcome — thorough note-taking or clear user guides will assist each clinical lay ‘photographer’ achieve image consistency.

Aim for best practise at capture, then fall back on image editing techniques if required. Do not rely on post capture editing to correct all errors, it cannot adjust pixel information that was not captured originally. *Figure 3* demonstrates what can be achieved — without any post capture editing

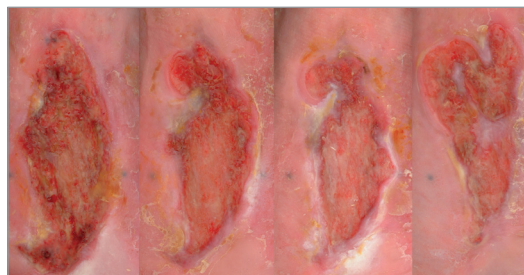


Figure 3. Monthly CVLU image sequence, aligned via on patient registration marks

— when both optimum positioning and capture consistency are combined.

OPTIMUM POSITIONING

Consider the following priorities, determine the best compromise between each, then document patient/photographer position for imaging and repeat for consistency.

Patient:

- ▶ Flat wound for imaging vs patient comfort, can both easily be achieved?
- ▶ Obstructions versus safety, can all dressings, clothing and jewellery be removed from the imaging area?
- ▶ Consistent background versus convenience, white disposable roll is preferred or a consistent colour of surgical drape if possible.

Photographer:

- ▶ Capture the entire wound perpendicular to its centre, as it heals/changes, maximum information will still be captured. Can both patient comfort and sufficient wound detail to be achieved, e.g. could wound indentation/texture be photographed from the side, if so always accompany with a planimetric view as shown in *Figure 4*.

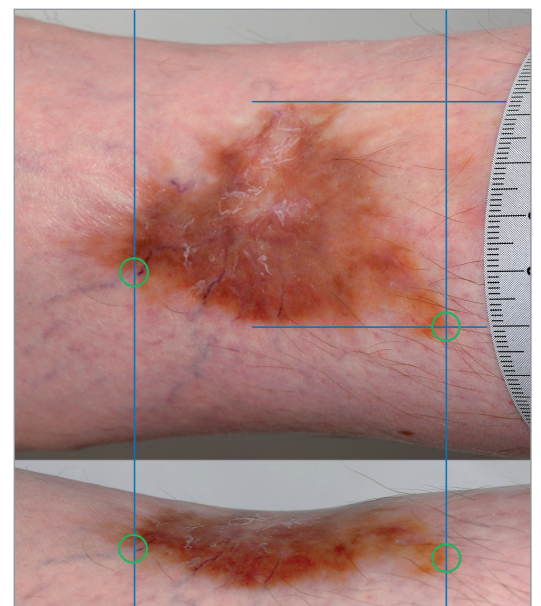


Figure 4. Combined planimetric and oblique image of a healed leg ulcer, demonstrating (for info only) alignment points and scale reference lines

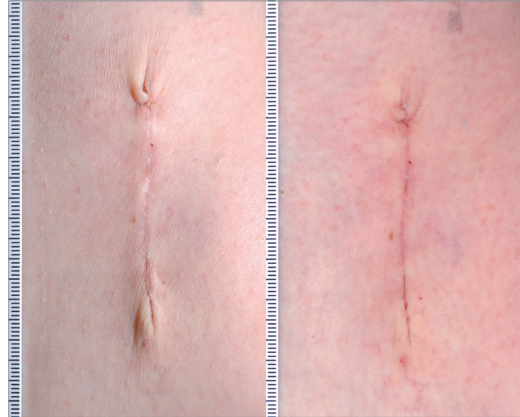


Figure 5. Excision site L-R; oblique lighting for surface detail, cross-polarised for colour only

▶▶ Longer focal lengths (zoom*) versus wide-angle, if possible; stand back to capture the entire wound rather than using a wider-angle setting; the resultant image has a more natural/flattering appearance, wide-angle lenses also introduce image distortion and are less forgiving if the photographer is not quite perpendicular to the wound. *Optical zoom is preferred; digital zoom just enlarges and crops the image within the camera.

WOUND LIGHTING

The preferred and most consistent method of wound lighting, flash, is discussed here. If relying on ambient light, the points below are applicable and attainable but would require greater effort and expertise to achieve results comparable to flash lighting.

Flash:

- ▶▶ Has sufficient power to override (changeable) ambient conditions, it's power can be precisely controlled and allows for greater depth of field/sharpness.
- ▶▶ The direction, filtration and area of the flash light source can easily be configured to highlight a specific wound characteristic (*Figure 5*).
 - a) Cheap diffusers reduce glare from on-camera flashes, they are available for most models — even some compact cameras — and unnamed brands can be found for less than £5 each. *Figure 6* is a branded example.
 - b) Stand-alone flashes can be positioned on or off-camera and triggered either directly by the camera or via a remote. *Figure 7* shows



Figure 6. Garry Fong type (on-camera) diffuser



Figure 7. Nikon SB-R200 flash units

the most versatile (Nikon) model, where any number can be positioned and triggered by the camera.

Exposure:

- ▶▶ Auto TTL (through the lens) exposure will adjust the flash output until the image is correctly exposed. When calculating correct exposure though, the camera is influenced by prominent areas of glare or shadow and adjusts its exposure accordingly.
- ▶▶ Ensure consistent patient and photographer positioning to limit any exposure variability. Enlarge and inspect your images on-camera, and ask is there too much glare or shadow where greater wound detail would be preferred for this wound?

Colour balance:

- ▶▶ Auto white balance (WB), as with (TTL) exposure, will result in acceptable images on most occasions, but when such images are placed in a sequence, some will always require minor adjustments. Maintain consistency where possible; as with all automatic functions

strong colour changes within images and between visits will influence how the auto WB captures each wound.

- ▶▶ Manually setting the WB to 'flash' will ensure consistency from a camera perspective but not necessarily accuracy; flash diffusers, patient clothing and surgical drapes all change the colour of light which is illuminating the wound.

Option 1 will work for most clinical environments, whereas option 2 is intended for those more familiar with photography. If required to prove consistency, e.g. to measure objective colour changes in a wound, then contact a professional to manually calibrate and fix both the camera and flash output settings.

WOUND SCALE

Include scale at the same focal plane (distance) as the wound, wrap around the limb/body so there is always one section perpendicular to the lens; white or grey adhesive tape is preferred, right-angled and sterile rulers are also available:

- ▶▶ Place adjacent to wound and retain in the final image, alternatively move scale away from the wound at the time of capture (but in the same plane) and crop from final image after resizing.
- ▶▶ If scale cannot be captured or was omitted in error, use a wound reference points to align a series of images, the result can be professional if all images are taken perpendicular to the lens.
- ▶▶ If unable to include scale due to wound position, include within a reference image then omit from the challenging image. Rather than show a selection of inconsistent or low-quality images, capture those achievable professionally and align the images as shown in *Figure 4*.

IMAGE EDITING

Save the original image unchanged, always edit a copy in Photoshop Elements (or similar <£100) for high-end adjustments or use Format Picture within PowerPoint as required for each presentation. PP offers a diverse range of easy to use sharpness, exposure and colour balance adjustments, in addition to more precise fine-tuning adjustments, within each Format Picture Options section.

IMAGE PRESENTATION

If the previous sections have been followed (where possible), then cropping and fine tuning any minor image errors will result in a professional presentation of the wound(s). When considering the priorities below, always apply them consistently to an individual wound sequence and where possible throughout the entire presentation / article:

- ▶▶ Display all wounds at the same scale/magnification (*Figures 1–3*), if a particular section requires enlarging, show separately from the sequence and identify its point of origin.
- ▶▶ Crop-out background or unnecessary distractions but ensure consistent image size within a sequence — in PP tick Gridlines within the View menu to assist. If both length and width cannot be consistently achieved, align at least one dimension (*Figure 4*) or separate the images with a gap, as shown in *Figure 5*.
- ▶▶ All images within a sequence should display the same level of sharpness, brightness and colour balance. View any sequence in its entirety and only adjust those individual images or characteristics that are noticeably different. Viewers will forgive one inconsistent image if it completes the expected wound sequence, but if a substandard image cannot be omitted, add a small comment beneath, e.g. flash failed during visit.

When creating a presentation, use the largest (file size) resolution images (ppi) possible and save when finalised. If unable to email or display due to file size, save a copy of the presentation, double click on an image to access Compress Pictures, then Compress All Images – to the next lowest ppi option — and Delete Cropped Areas, Save and repeat until the presentation is small enough to be transferred successfully.

CONCLUSION

Images instantly provide reference detail to wounds, from which point treatment and research decisions commence. All too often the results of exciting research or innovative treatment regimes are let down by the lack of image quality or clear presentation. Accurately capturing and consistently presenting wound images provides the gold standard that allows outcomes to be assessed with clarity and confidence.