# Improving the Quality of Smartphone-Based Medical Photography for Burns Patients: A Quality Improvement Project

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## Abstract

**Introduction.** High-quality clinical photography is essential in burns management, providing an objective record of wound progression, supporting multidisciplinary communication, and fulfilling medico-legal requirements. Smartphone photography is increasingly used for bedside documentation because of its speed and accessibility, but image quality is often inconsistent, and no standardised guidelines currently exist. This quality improvement project aimed to evaluate and improve the quality of smartphone-based burns photography in a busy burns unit.

**Methods.** A retrospective review of 200 patient image sets was undertaken at Wythenshawe Hospital, Manchester. 100 pre-intervention and 100 post-intervention image sets were assessed against eight parameters adapted from best practice guidelines, including clarity, lighting, background, wound coverage, perpendicular angle, distance, inclusion of close-up and distant views, and documentation of wound location. A concise guidance card containing prompts addressing key photography standards was attached to clinical smartphones to support staff during image capture. Statistical analysis was performed using a chi-square test for independent samples.

**Results.** Post-intervention, documentation of wound location improved significantly from 17% to 45% ($p < 0.001$). Modest, non-significant improvements were observed in adequate lighting (57% to 69%) and perpendicular imaging (77% to 85%). Full wound capture increased from 71% to 79%. However, inclusion of both close-up and distant images declined from 39% to 19% ($p = 0.002$), while other parameters remained largely unchanged.

**Discussion and Conclusions.** A simple, low-cost intervention produced measurable improvements in the consistency of

burns photography, particularly in documentation of wound location. While gains were modest in other domains, the findings suggest that structured visual prompts can improve the consistency of clinical documentation practices. This project highlights the feasibility of low-resource interventions to enhance wound imaging quality. The approach is scalable to other units and healthcare systems, with potential to improve patient safety, communication, and clinical governance. Further studies should assess sustainability and adaptation in wider clinical contexts.

**Keyword:** Burn, Documentation, Image Enhancement, Photography, Quality Improvement, Smartphone, Wounds and Injuries

## Introduction

Burn injuries vary widely in type and severity, making standardised documentation essential for tailoring treatment plans, ensuring continuity of care, and fulfilling medico-legal requirements.[1] High-quality clinical photography plays a crucial role in this process, offering a reliable visual record of wound progression over time and supporting multidisciplinary discussions.[2]

Traditional medical illustration relies on high-resolution DSLR cameras operated by trained photographers and remains widely regarded as the gold standard for clinical imaging.[3] Within our burns unit, these images are routinely obtained during standard weekday working hours. However, medical illustration services operate primarily during daytime hours and support multiple specialties across the hospital. Acute burn admissions are unpredictable and frequently occur outside these periods. In addition, burns patients often require repeated wound assessments during ward rounds, dressing changes, and operative procedures throughout their admission. It is therefore not operationally feasible to schedule medical photographers for every episode of wound review, particularly given workforce limitations and competing clinical demands.

As a result, departmental smartphones have become the alternative method of documentation for out-of-hours and interim inpatient imaging. This transition reflects both local service realities and broader NHS digital strategies promoting secure mobile integration with electronic health records. Secure clinical applications enable staff to capture and upload images directly into electronic records at the bedside, providing rapid and accessible documentation when immediate input from the medical illustration team is not possible. From a practical perspective, resource constraints limit the feasibility of training all rotating medical and nursing staff in the use of high-resolution DSLR equipment for routine and out-of-hours imaging. In contrast, smartphones are widely familiar to healthcare professionals, require minimal additional technical training, and function as intuitive point-of-care devices. They are also comparatively straightforward to decontaminate between patient contacts.

Despite these advantages, smartphone photography is prone to variation in quality compared with DSLR imaging, which can limit its clinical utility.[4] Furthermore, no formal standards exist for smartphone-based wound photography, leading to inconsistent documentation that may affect clinical decision-making and patient safety.[2,5]

Several studies have evaluated the quality of wound photography using both smartphones and conventional digital cameras. Hsin et al. reported that nurses using a smartphone-based wound documentation system achieved high compliance with parameters such as lighting and background, but lower adherence for orientation and ruler placement, highlighting the variability of practice.[6] Graham et al. analysed over 500 digital photographs of post-mastectomy patients and reported good image clarity and lighting, while also noting variability in quality assessment between reviewers, demonstrating the challenges of evaluating clinical image quality.[7]

Other studies have explored the broader clinical use of smartphone photography. Li et al. found that most smartphone images used in open fracture management met key criteria for clarity, context,

and comprehensiveness, although adherence was not universal.[8] Training has also been shown to influence photographic accuracy, with Ozkok et al. demonstrating improved diagnostic representation of injuries following structured photography education.[9] In emergency care settings, Liu et al. reported substantially faster image upload times with smartphones compared with digital cameras, supporting their practicality in acute clinical environments.[10] Bruce et al. emphasised that wound photography should be used as an adjunct to clinical assessment rather than a replacement, noting that interpretation of images alone may sometimes lead to inaccurate clinical impressions.[11]

Although smartphone-based wound photography is increasingly used in clinical practice, there is limited published evidence evaluating structured interventions designed to improve or standardise image capture, particularly within burns care. Given the growing reliance on smartphone-based images in our burns service, this gap made it timely to reassess local practice and explore whether a simple, structured intervention could improve the consistency and clinical utility of wound photography.

Variability in smartphone-based clinical photography may reflect differences in staff experience, competing clinical priorities, and the absence of clear, standardised guidance regarding image capture. Concise cognitive aids and visual prompts have been shown to support task consistency by reducing reliance on memory and clarifying expectations at the point of care.[12] We therefore hypothesised that introducing a simple guidance card outlining predefined quality parameters, designed to be easily referenced during image capture, could improve standardisation of image capture practice and increase compliance with these criteria.

The aim of this quality improvement project was to evaluate and enhance the quality of smartphone-based burn injury documentation within our burns unit through the implementation of a structured visual guidance tool.

The specific objectives were:

- To assess baseline compliance with predefined photographic quality parameters.
- To implement a concise guidance card designed to support standardised image capture.
- To re-evaluate compliance following implementation to determine the impact of the intervention.
- To identify residual areas of non-compliance to inform future quality improvement initiatives.

## Methods

### *Design and Setting*

This study was conducted within the Adult Burns Centre at Wythenshawe Hospital, a 12-bed tertiary burns unit attached to the adult intensive care unit within Manchester University NHS Foundation Trust. The unit comprises dedicated burns ICU and high-dependency rooms, side rooms, ward beds, and an on-site burns operating theatre, supporting the management of patients with complex burn injuries across a range of clinical acuities. Smartphone-based clinical photography forms part of routine documentation practice and is most frequently undertaken by experienced nursing staff during dressing changes, particularly outside standard medical photography service hours. Trust-issued smartphones (iPhone 13 devices - Apple®) are used for image capture, and photographs are uploaded directly to the secure electronic patient record system. Although medical photography services are available during standard working hours, no formalised smartphone-specific photography training was routinely provided to ward staff prior to this project. This operational model creates reliance on pragmatic bedside image capture, with potential variability in technique and adherence to quality standards.

A retrospective review of burn injury documentation was undertaken, focusing on the quality of smartphone-based clinical photography. Images were accessed through patients' electronic medical records. No patient recruitment occurred, and all data reviewed were part of routine clinical documentation.

### *Sample*

Two cohorts of 100 image sets were evaluated: pre-intervention (01 September - 29 November 2024) and post-intervention (25 January - 25 March 2025). Image sets were identified retrospectively from the electronic medical record in chronological order within the defined study periods until 100 eligible sets were obtained for each phase. An image set comprised all photographs taken during a single documentation episode (e.g., during a dressing change). As such, multiple image sets could originate from the same patient across different time points during their admission.

*Assessment Criteria*

As no national standards exist for smartphone-based wound photography, eight assessment parameters were developed from best practice guidance on smartphone medical photography published in the BMJ and refined in consultation with senior burns clinicians within the unit to reflect practical documentation requirements in burns care.2 The parameters were derived from key photographic principles described in the guidance, including lighting, focus, anatomical context, and perspective. Based on these principles, eight assessment parameters were defined: documentation of injury location, image clarity, background, lighting, perpendicular angle, adequate distance, inclusion of both close-up and distant images, and full burn coverage. Each parameter was assessed using a dichotomous (present/absent) scoring approach. For an image set to meet a criterion, all images within the set were required to comply, except for location documentation, which was required only on the first image. This approach was used to ensure that each photographic series provided a complete and clinically interpretable representation of the injury.

*Intervention*

Preliminary review of smartphone-based burn photography within the unit identified inconsistent adherence to several key photographic principles, including documentation of injury location, lighting conditions, and inclusion of contextual images. In response to these findings, a concise instructional guidance card was designed and attached to the back of all departmental smartphones used for burn photography (Figure 1). The card provided visual prompts on best practice (clear background, good lighting, perpendicular views, contextual and close-up images, and anatomical site documentation) and served as an immediate reference during image capture. The prompts were intentionally limited to a small number of practical cues to ensure the card remained concise and usable during routine clinical care.

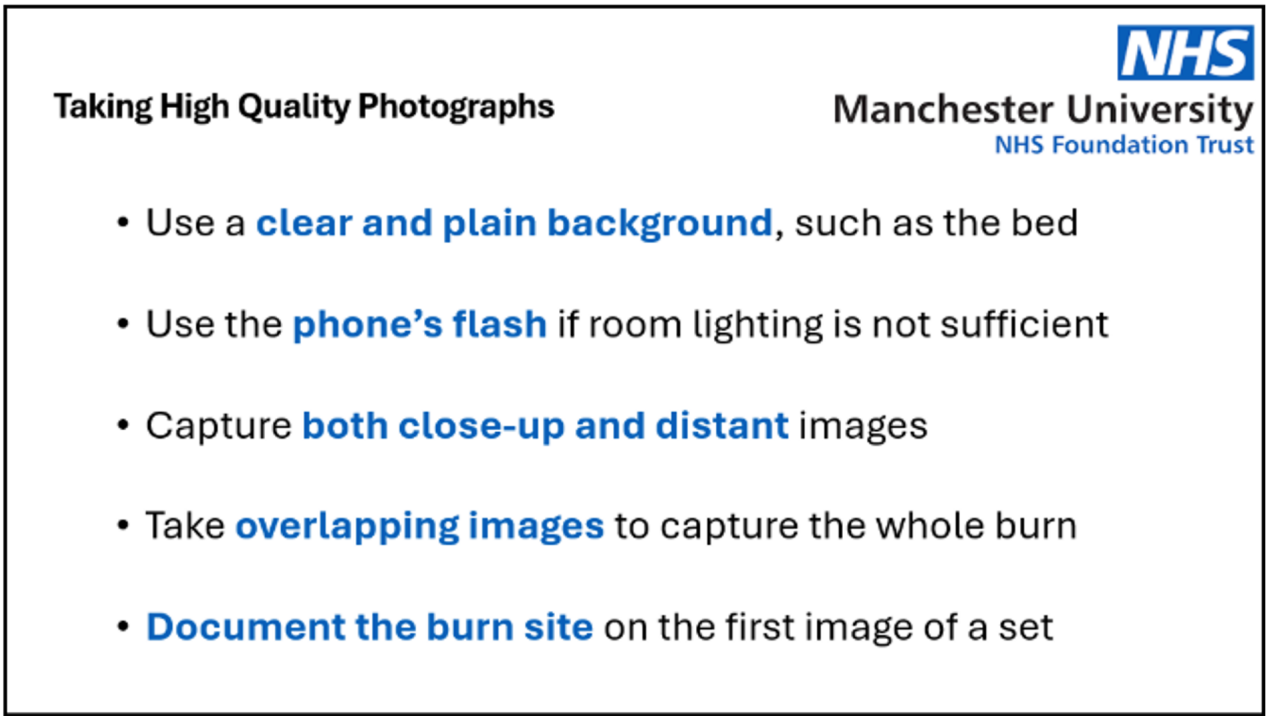


Figure 1. Instructional guidance card attached to departmental smartphones used for burn photography.

*Data Analysis*

Data were analysed using jamovi version 2.6. Differences in proportions between pre- and post-intervention image sets were compared using the chi-square test for independent samples. A p-value of <0.05 was considered statistically significant.

*Ethical Considerations*

This project was registered with the local clinical governance and audit department as

a service evaluation of clinical documentation practice within the burns unit. As the project involved retrospective review of routine clinical documentation and formed part of a local quality improvement initiative, formal research ethics committee approval was not required in accordance with NHS Health Research Authority guidance. All images were reviewed securely within the electronic patient record system, and no identifiable data were extracted outside the clinical system. Images were captured using Trust-issued devices and stored within the secure hospital record system in accordance with institutional data protection and confidentiality policies.

## Results

A total of 200 image sets were analysed, including 100 pre-intervention and 100 post-intervention sets.

*Primary outcome*

The intervention was associated with a statistically significant improvement in documentation of wound location, increasing from 17/100 (17%) pre-intervention to 45/100 (45%) post-intervention ($\chi^2$ = 18.33, p < 0.001).

*Secondary outcomes*

Rates of adequate lighting increased from 57/100 (57%) to 69/100 (69%) sets (p = 0.079), and perpendicular views from 77/100 (77%) to 85/100 (85%) sets (p = 0.149), although these changes were not statistically significant. Full wound capture also rose modestly from 71/100 (71%) to 79/100 (79%) sets (p = 0.191).

Image clarity and distance from the wound were already high at baseline and remained largely unchanged (81/100 to 82/100; 97/100 to 99/100). Conversely, adherence to including both close-up and distant images declined significantly, from 39/100 (39%) to 19/100 (19%) sets ($\chi^2$ = 9.71, p = 0.002), while use of a clear background decreased slightly from 80/100 (80%) to 76/100 (76%) (p = 0.495).

Adherence to the eight predefined photography parameters before and after the intervention is summarised in Table 1.

Table 1. Adherence to photography parameters before and after the intervention (n = 100 image sets per group).

| Parameter | Pre-intervention (%) | Post-intervention (%) | Change (%) | p-value |
|---|---|---|---|---|
| Location documented | 17 | 45 | +28 | <0.001 |
| Image clarity | 81 | 82 | +1 | 0.856 |
| Clear background | 80 | 76 | -4 | 0.495 |
| Adequate lighting | 57 | 69 | +12 | 0.079 |
| Perpendicular angle | 77 | 85 | +8 | 0.149 |
| Adequate distance | 97 | 99 | +2 | 0.312 |
| Distant and close-up images | 39 | 19 | -20 | 0.002 |
| Full burn photographed | 71 | 79 | +8 | 0.191 |

## Discussion

The absence of formalised standards for smartphone-based burn photography makes comprehensive assessment of compliance challenging. However, we observed high pre-intervention adherence for clarity (81%), clear backgrounds (80%), and perpendicular alignment (77%). Additionally, most images were taken from an adequate distance (97%) and captured the full burn site (71%). In contrast, compliance with documenting the site photographed (17%), adequate lighting (57%), and inclusion of both close-up and distant views (39%) was lower. These gaps may reflect variability in practice in the absence of structured guidance or formalised training, contributing to inconsistent documentation.

When comparing our findings with previous studies, baseline compliance rates for clarity were similar to those reported by Graham et al., whose study used digital cameras.[7] Rates for background and perpendicular alignment were slightly

lower than Hsin et al., while lighting compliance was markedly lower.[6] Differences likely reflect methodological variation (assessing whole image sets rather than single images) and the challenges of photographing complex burn sites compared with more standardised anatomical regions in other clinical contexts.

Post-intervention, improvements were observed in several parameters, including lighting, perpendicular angle, and full burn capture, though only wound location documentation improved significantly ($p < 0.001$). Interestingly, adherence to inclusion of both close-up and distant images declined despite being addressed in the intervention. This decline suggests a potential unintended trade-off, highlighting the importance of monitoring balancing measures in future interventions. Possible explanations include variation in burn location, differences in clinician experience, or greater focus on other parameters.

Overall, these findings suggest that low-cost visual prompts may be associated with improvements in certain documentation behaviours, although their effects may be modest and inconsistent across different quality domains. These findings are broadly consistent with literature on cognitive aids and behavioural prompts, which suggests that simple visual reminders can influence task performance and reduce reliance on memory in complex clinical environments.[12] Additional or complementary strategies may therefore be necessary to achieve more comprehensive and sustained improvements.

The intervention was feasible, low-cost, and easy to integrate into routine practice. Although improvements were modest, particularly beyond wound location documentation, the approach demonstrates the potential for practical, resource-efficient solutions to enhance clinical documentation. Its simplicity makes it attractive not only within NHS services under financial pressure but may also be applicable in resource-limited healthcare settings.

To our knowledge, few published studies have evaluated targeted interventions to improve smartphone-based wound photography. This highlights the importance of our findings and supports the need for further research into sustainable, scalable approaches.

*Limitations*

Several limitations should be considered when interpreting the findings of this study. The study employed a pre-post design without randomisation or matching of patients between study periods. Image sets were collected over two separate three-month periods and therefore are likely to represent different patients with varying burn characteristics, including differences in burn severity, anatomical location, total surface area involved, and burn aetiology. As a result, variation in underlying clinical presentations may have influenced image characteristics independently of the intervention.

All image sets were assessed by a single reviewer who was not blinded to the study phase. This introduces the potential for assessment bias, and the absence of multiple assessors means that formal inter-rater reliability could not be evaluated. Although a structured scoring framework was used, the scoring process may therefore contain a degree of subjectivity. The image assessment framework used in this study was developed locally using available guidance and piloted within the project rather than derived from a previously validated assessment tool. While this reflects the limited availability of validated tools for assessing clinical image quality in routine practice, it may limit comparability with other studies.

Finally, the study was conducted within a single regional burns service, and local practices surrounding image capture and clinical documentation may differ from those in other institutions. While improvements in image quality were observed following the intervention, the sustainability of these improvements beyond the study period was not formally assessed. As such, the findings may not be fully generalisable to other clinical settings or sustained over longer follow-up periods.

*Clinical Implications*

- Smartphone photography is widely used for out-of-hours clinical care in burns care, but the absence of standardised guidelines leads to variability in documentation.
- Introducing a concise guidance card improved documentation of wound location and showed modest improvements in other quality parameters.
- Improved standardisation of photography practices may support patient safety, clinical decision-making, and medico-legal documentation by enhancing consistency in image capture.
- This approach is practical and may be adaptable to other clinical settings, supporting

the development of broader, evidence-based guidelines for wound photography.

## Conclusion

This quality improvement project showed that introducing a simple, low-cost guidance card for smartphone photography significantly improved documentation of wound location and modestly enhanced other quality parameters in burn injury imaging. Although improvements were not universal, the intervention was practical, easy to implement, and well suited to routine clinical use. These findings highlight the potential of straightforward, resource-efficient strategies to improve the consistency and clinical utility of wound photography, supporting both patient safety and quality of care. Future work could explore complementary approaches, such as staff training or digital prompts, to achieve more consistent and sustained improvements.

## References


1. Milner SM. *Classification of Burn Depth.* Eplasty. 2024;24:QA5. Published 2024 Feb 28.
2. Zoltie T, Blome-Eberwein S, Forbes S, Theaker M, Hussain W. Medical photography using mobile devices. *BMJ*. 2022 Aug 26;378:e067663. https://doi.org/10.1136/bmj-2021-067663.
3. Parsa S, Basagaoglu B, Mackley K, Aitson P, Kenkel J, Amirlak B. Current and Future Photography Techniques in Aesthetic Surgery. *Aesthet Surg J Open Forum*. 2021 Nov 29;4:ojab050. https://doi.org/10.1093/asjof/ojab050
4. Thornton SM, Attaluri PK, Wirth PJ, Shaffrey EC, George RE, Carbullido MK, Rao VK. Picture Perfect: Standardizing and Safekeeping Clinical Photography in Plastic Surgery. *Aesthet Surg J Open Forum*. 2024 Mar 20;6:ojae012. https://doi.org/10.1093/asjof/ojae012
5. Wongvibulsin S, Feterik K. Recommendations for Better Adoption of Medical Photography as a Clinical Tool. *Interact J Med Res*. 2022 Jul 18;11(2):e36102. https://doi.org/10.2196/36102
6. Hsin PH, Lee TT, Liu CY, Chou SS, Mills ME. Exploring the Effectiveness of Nurses' Usage of a Wound-Photography System. *Comput Inform Nurs.* 2024 Jun 1;42(6):430-439. https://doi.org/10.1097/CIN.0000000000001095
7. Graham PH, Plant NA, Graham JL, et al. Digital photography as source documentation of skin toxicity: an analysis from the Trans Tasman Radiation Oncology Group (TROG) 04.01 post-mastectomy radiation skin care trial. *J Med Imaging Radiat Oncol.* 2012;56(4):458-463. https://doi.org/10.1111/j.1754-9485.2012.02365.x
8. Li MK, Howard DP, King R. "A picture tells a thousand words" smartphone-based secure clinical image transfer improves compliance in open fracture management. *Injury.* 2019;50(7):1284-1287. https://doi.org/10.1016/j.injury.2019.05.010
9. Özkök A, Akar T, Demirel B. The effect of photography training on the accurate representation of gunshot and stab wounds in autopsies: a comparative study. *Forensic Sci Med Pathol.* 2024;20(4):1166-1177. https://doi.org/10.1007/s12024-023-00750-y
10. Liu CH, Lin IC, Lu JJ, Cai D. A Smartphone App for Improving Clinical Photography in Emergency Departments: Comparative Study. *JMIR Mhealth Uhealth.* 2019;7(7):e14531. Published 2019 Jul 31. https://doi.org/10.2196/14531
11. Bruce J, Knight R, Parsons N, et al. Wound photography for evaluation of surgical site infection and wound healing after lower limb trauma. *Bone Joint J*. 2021;103-B(12):1802-1808. https://doi.org/10.1302/0301-620X.103B12.BJJ-2021-0447.R1
12. Greig PR, Zolger D, Onwochei DN, Thurley N, Higham H, Desai N. Cognitive aids in the management of clinical emergencies: a systematic review. *Anaesthesia.* 2023;78(3):343-355. https://doi.org/10.1111/anae.15939