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Can Wound Photographs Support Treatment Claims A Critical Review of Calibration Assessment and Clinical Interpretation

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Abstract

Photographs can document wound change, but their evidential value depends on how images are obtained and assessed. This critical narrative review examines primary studies of photographic wound assessment and their implications for Ayurvedic case reports. Research supports photographic assessment under defined conditions, while also demonstrating variation between observers and between the properties being measured. A photograph suitable for identifying a wound is not automatically suitable for area measurement, tissue classification or confirmation of closure. We propose a practical framework covering consent, image identity, timing, calibration, consistent capture and preservation of originals. Photographs should be interpreted alongside clinical examination and documented care. They cannot establish the cause of improvement in an uncontrolled case or provide missing vascular and infection findings. Prospective image planning can strengthen a case report, whereas retrospective enhancement cannot recover information that was never recorded.

Keywords

Wound photography; case reports; calibration; planimetry; image assessment; Ayurveda

Introduction

A before and after photograph is persuasive because the reader can see a difference. That visual comparison also creates a risk: the apparent size and colour of a wound can change with camera angle, distance and lighting. A compelling image pair should therefore be examined as a measurement problem as well as a clinical illustration.

Ayurvedic wound reports frequently concern treatments delivered alongside cleansing, dressings and general care. Images can document the clinical course, but they cannot isolate which component caused the change. The appropriate question is what the photographs establish and what still depends on the clinical record.

Review approach

Targeted searches of PubMed indexed literature were conducted on 19 and 20 November 2026 using wound photography, photographic assessment, planimetry, reliability and epithelialisation. We selected primary studies addressing measurement and observer performance. CARE guidance informed case report documentation. This is a critical narrative review, not a systematic audit of photographs published in Ayurvedic journals.

Sources were organised by the question they could answer: direct clinical evidence, formulation or measurement evidence, and general methodological guidance. Clinical reports were interpreted within their population, comparator and follow up; laboratory findings were used only for the measured property. Proposed explanations and research priorities are identified as interpretation rather than established treatment effects. The synthesis does not claim comprehensive retrieval, duplicate independent screening or a formal risk of bias assessment. Consequently, the examples support a critical argument but cannot determine the frequency of a reporting problem or a pooled estimate of benefit.

Table 1 Selected evidence and its interpretation

Source	Design or material	Direct contribution	Boundary of inference
Rennekampff and colleagues[1]	Photographic epithelialisation assessment study	Tests observer assessment under a defined protocol and wound context.	Its closure definition should not replace a different prespecified complete closure criterion.
Van Poucke and colleagues[2]	Comparison of digital area methods	Shows the relevance of boundary selection and observer technique.	Results do not validate every software method.
Landa and colleagues[3]	Digital wound analysis reliability study	Examines area and tissue classification separately.	Reliability for one measured feature does not establish reliability for another.

A photograph has several possible purposes

An image can identify the wound location, illustrate a procedure, measure surface area or support assessment of healing. These purposes require different standards. A procedure photograph showing a retained liquid may explain how treatment was delivered while obscuring the wound bed. It should not be used as the principal image for measuring the wound at that time.

Photographic analysis of epithelialisation has been tested against clinical assessment in defined wound settings.[1] The study demonstrates that remote assessment can be feasible under a specified protocol. Its endpoint definition and wound population should be reported when interpreting its findings. It does not establish that every unstandardised image can confirm complete closure.

Calibration and boundary selection

Area measurement requires a scale and an appropriate geometric relationship between the scale and the wound surface. A ruler far above or below the wound plane can introduce distortion. Curved anatomical regions create additional problems because a two dimensional image does not fully represent their surface.

Boundary selection is another source of uncertainty. Van Poucke and colleagues compared digital area measurement methods and identified differences related to technique and observers.[2] The clinical implication is that the same method should be used consistently and the wound boundary should be defined. Software cannot remove ambiguity about whether pale skin at an edge is open wound, new epithelium or another feature.

Digital analysis studies also show that reliability can differ between area and tissue classification.[3] An accurate outline does not guarantee accurate identification of necrosis or granulation. Researchers should report the property being assessed rather than describe image analysis as uniformly objective.

Table 2 Image purposes and minimum requirements

Purpose	Useful requirements	Main limitation
Clinical illustration	Date, site and consistent orientation	Limited quantitative interpretation
Surface area measurement	Scale, suitable angle and defined boundary	Depth and curvature remain incompletely represented
Tissue classification	Adequate detail, lighting and trained assessment	Colour alone can be misleading
Closure assessment	Defined endpoint and appropriate image series	Needs clinical corroboration
Procedure description	Clear view of the delivery method	Wound bed may be obscured

Assessment quality and observer performance

The revised Photographic Wound Assessment Tool was evaluated using images of chronic wounds from several aetiologies.[4] That evidence supports a structured approach in the studied context. If a case report uses a different scoring method, it should not borrow the validation claim of that tool.

Blinded assessment can reduce expectation effects when photographs are compared in a trial. For a case report, independent review can still help clarify an uncertain endpoint, although it cannot create a control group. The assessor should know which clinical question is being answered and have sufficient image quality for that purpose.

What photographs cannot establish

A dorsal foot image cannot supply missing findings about pulses, protective sensation, deep tissue involvement or the cause of an ulcer. Apparent reduction in an open area also cannot establish infection resolution. These require appropriate clinical assessment. A photograph should therefore complement the case narrative rather than replace essential patient information.

Nor does an image sequence prove treatment efficacy. Healing can reflect background care, changes in pressure or other concurrent treatment. The uncontrolled case remains an observation of a course after an intervention. CARE provides a structure for reporting that course transparently, including the timeline and consent.[5]

A prospective image workflow

Photographs should be planned when care begins. The record needs the same patient and wound identity across images, dates linked to treatment and a clear account of any dressing or cleansing before capture. Raw images should be retained. Cropping for layout should not remove information necessary to interpret the wound, and any permitted adjustment should preserve clinical content.

Table 3 Proposed photographic record for a case report

Stage	Record
Before capture	Consent, patient code, wound site and date
Capture	Camera setup, scale, orientation, lighting and preparation of the wound
Storage	Original image and linkage to the clinical visit
Measurement	Boundary rule, assessor and software if used
Figure preparation	Panel dates, any adjustments and an accurate caption
Interpretation	Clinical findings supporting or limiting the visual conclusion

The figure caption should state what is shown. Terms such as pre treatment and follow up require verified timing. If the interval is unknown, the image cannot support a rate of healing. If final dimensions were not measured, a percentage reduction should not be calculated from visual impression alone.

Image acquisition is part of the measurement method

The quality of a wound image begins before the shutter is released. The intended purpose should determine the view, scale and preparation. An overview can establish anatomical location, while a closer image may be needed to assess the wound surface. Trying to use one photograph for every purpose can compromise both. A procedure image may show hands, equipment or fluid that obscures the lesion. It remains useful as documentation of delivery, but a separate unobstructed image is needed if the study intends to measure the wound at that visit.

Camera position should be sufficiently consistent to support comparison. A change in distance alters apparent size, while an oblique view can distort shape. A scale can help with size calibration, but it cannot fully correct a surface that curves away from the image plane. The relevant issue is not whether a photograph looks professional. It is whether the geometry supports the measurement claimed. A visually attractive angle may be less suitable for planimetry than a plain perpendicular view. The capture protocol should therefore follow the analytical purpose rather than aesthetic preference.

Lighting also affects interpretation. Shadows can conceal a margin, glare can obscure a moist surface and colour balance can change the apparent tissue colour. Consistent conditions reduce avoidable variation, but they do not make colour an infallible diagnostic measure. A study using colour based assessment should describe how capture and display were managed and acknowledge residual uncertainty. The image should not be interpreted as an objective tissue assay simply because it is digital. Digital recording preserves pixels; it does not guarantee that the pixels represent clinically meaningful categories accurately.

Calibration requires the right reference

A scale must be visible, legible and positioned appropriately relative to the wound. A ruler placed on a different plane can produce an incorrect conversion between pixels and physical distance. The wound and reference should therefore be considered together during capture. If a wound extends across a strongly curved region, a single planar reference may be inadequate for the intended calculation. The report should acknowledge that limitation. It should not claim exact surface area merely because software accepts a scale value and returns a number with several decimal places.

Calibration also needs to be repeated or verified across visits. A photograph taken closer to the lesion cannot be compared through raw pixel counts with an earlier distant view. Reusing one calibration factor across images is inappropriate unless the capture system genuinely preserves the required geometry. The method should state whether each image was calibrated separately and how unreadable or missing scales were handled. Images unsuitable for measurement may still be retained as illustrations, but they should not silently enter a quantitative series. The distinction protects both the measurement and the value of the remaining visual record.

A reference label can support identity and timing, but it introduces privacy considerations. A study code and verified visit date are preferable to unnecessary personal details within the image. The clinical record should link the code to the correct participant and wound under the institution's data arrangements. The figure prepared for publication should contain only information needed for interpretation. Consent for clinical photography and consent for publication may involve different uses, so the actual documentation should be checked rather than inferred. CARE guidance places informed consent within a transparent case reporting process.[5]

The wound boundary is a clinical judgement

Planimetry depends on deciding which pixels belong to the open wound. That decision can be uncertain at an irregular edge, around maceration or where new epithelium is difficult to distinguish. Software can calculate an area from a selected outline, but it cannot remove uncertainty in the outline itself. The comparison by Van Poucke and colleagues found differences related to method and observer perception of the margin.[2] A research protocol should define the boundary used and explain how uncertainty is handled. This is a clinical and measurement issue rather than a purely computational one.

Repeated measurements should use a consistent method. Switching between freehand tracing, polygon selection and a rectangular estimate can introduce change unrelated to healing. If a change of method is unavoidable, it should be documented and its effect considered rather than treated as seamless continuity. Independent duplicate assessment can help quantify uncertainty in selected studies, but the analysis must preserve which observer made each measurement. Averaging several outlines without describing disagreement can conceal the practical difficulty. A credible method reports both the resulting estimate and the conditions under which it can be reproduced.

The measurement unit should also be clear. Surface area, maximum length and maximum width are different quantities. A wound can change shape while one maximum dimension remains stable. Multiplying length by width estimates a rectangle, not the exact area of an irregular lesion. A paper should label that approximation honestly. Depth, tunnelling and undermining remain outside ordinary two dimensional area measurement. They require appropriate clinical assessment and should not be inferred from shadow, perspective or the apparent depth of a photograph. An image may suggest complexity without quantifying it.

Reliability differs across image based outcomes

The digital wound analysing study reported very high agreement for surface area but lower interrater performance for some tissue classifications.[3] This is an important distinction because a software platform may perform differently for different tasks. A validation statement should identify the property assessed rather than describe the entire system as uniformly accurate. The ability to outline an area does not establish the ability to classify necrosis, quantify granulation or diagnose infection. Those tasks depend on different information and may have different observer error. A review should preserve the distinction even when the same image supplies all the inputs.

The revised Photographic Wound Assessment Tool was evaluated in a chronic wound sample containing several aetiologies.[4] Its results support structured assessment in the studied conditions, with performance varying by reliability question. They should not be transferred automatically to a locally invented scale or to photographs captured without comparable quality. The tool name, version, assessor training and scoring procedure should be reported. If only selected items are used, the modification needs acknowledgement. A shortened or adapted tool cannot borrow every property of the complete instrument without additional evaluation.

The photographic epithelialisation study examined remote judgement of closure in defined partial thickness wound settings and compared it with clinical assessment.[1] Its findings support feasibility, while the reported agreement remains short of perfect. The clinical lesson is not that photographs are useless or decisive. It is that remote assessment can contribute under a protocol and that the wound population and endpoint matter. A chronic ulcer with complex depth and surrounding tissue changes presents a different assessment problem from a partial thickness wound. Applicability must be judged through those differences rather than through the common use of a camera.

Image series should preserve the clinical time line

A useful series begins with verified dates linked to treatment. Labels such as before, during and after are insufficient when the interval is central to the claim. The reader should know whether the final image was taken after one week, several months or an unknown period. Without verified timing, a figure cannot support a healing rate. A photograph taken during a procedure may also document a different state from one taken after cleansing at a follow up visit. Captions should identify those conditions so that unlike views are not presented as equivalent measurements.

The sequence should not omit clinically important deterioration. Selecting only the best baseline and best follow up views can create a misleading impression of steady progress. A case report need not publish every image, but its narrative should describe setbacks, treatment changes and residual problems. A trial should use a prespecified image schedule and a transparent rule for selecting publication panels. Original images should be retained so that the final figure can be traced to the record. The purpose is a verifiable clinical account, not a visual story constructed around a preferred conclusion.

Multiple wounds require stable identity. A later image of a smaller lesion cannot be assumed to represent the same index wound without an anatomical and record based link. Cropping can remove landmarks that would help establish that connection. A useful figure may therefore combine an overview with a detailed panel, with dates and site clearly stated. If two wounds merge or one changes substantially after a procedure, the narrative should explain the event. The figure cannot supply that history on its own, and readers should not have to infer it from appearance.

Blinding and independent assessment

In a comparative trial, assessors can sometimes be blinded to treatment assignment by using coded images. However, visible residues, characteristic marks or the order of healing may reveal information. The report should describe what was concealed and whether blinding could plausibly be maintained. Calling an assessment blinded does not establish that the assessor could not infer the group. Image order can also influence judgement when observers expect a later wound to look better. Randomised presentation may help for some measurement questions, while chronological review may be necessary for others. The choice should follow the endpoint.

Independent assessment can strengthen a case report when closure or tissue interpretation is uncertain, but it does not create causal control. Two observers agreeing that a wound became smaller cannot establish which treatment component caused the reduction. The distinction between measurement validity and causal inference is fundamental. Good photographs can make the observed course more credible while leaving attribution uncertain. This is a legitimate and useful outcome for a case report. It should not be presented as a weakness that can be removed through more dramatic images or additional retrospective scoring.

Observer training should use definitions and examples relevant to the task. The report should identify the assessor's role and the way disagreements were resolved. Consensus after discussion may produce a final value, but the original independent judgements remain necessary if agreement is being studied. A consensus value alone cannot quantify reproducibility. Similarly, a high correlation can coexist with systematic differences between assessors. Reliability studies should choose methods suited to agreement and report uncertainty, as recommended by GRRAS.[6] These principles help distinguish a plausible illustration from a defensible research measurement.

Editing integrity and publication figures

Figure preparation can include necessary layout changes, but it should preserve clinical content. Cropping, resizing and panel arrangement should not alter the wound or conceal relevant context. Selective colour adjustment, removal of tissue features or replacement of an unclear region would change the evidence. When a permitted global adjustment is made, the original should remain available and the change should be disclosed according to journal policy. A publication figure is a presentation of the record, not an opportunity to repair missing clinical information. Enhancement cannot recover an unrecorded scale, date or examination finding.

Captions should describe what the panels show and the verified intervals. A later smaller residual opening should be called a residual opening if closure has not been established. The caption should not assert complete healing because the image appears improved. Measurements should come from the documented method, not from visual estimation during manuscript preparation. If the final dimensions are missing, the paper should retain that limitation. A truthful image series can support a valuable clinical observation without a percentage reduction. Adding an invented precise value would weaken the entire case, including the valid photographs.

File handling also affects the evidence. Repeated compression, screenshots of screenshots and messaging application transfers may reduce detail or remove metadata. A prospective workflow should retain original files and prepare separate publication copies. The record should identify which image was measured and which was resized for layout. Metadata can support verification but should not be treated as infallible proof of timing because it can be missing or altered. The clinical record remains essential. The strongest workflow links original image, visit information, measurement record and final figure through a stable identifier.

Clinical interpretation beyond the frame

The image cannot replace a wound assessment. Perfusion, protective sensation, systemic symptoms, deeper involvement and the reason for ulceration may not be visible. Even local findings can require examination rather than colour interpretation. A photograph of a dorsal foot wound does not establish that the ulcer is neuropathic, ischaemic or infected. The manuscript should report the assessments actually performed and leave missing findings unknown. This protects the distinction between what the reader can see and what the clinical record supports. A compelling visual change should not invite invented negative findings about conditions never assessed.

The role of background care must also remain explicit. Cleansing, dressings, pressure changes and other concurrent treatment can contribute to the observed course. A case report can describe improvement after an Ayurvedic intervention while acknowledging that it cannot isolate the intervention's effect. CARE encourages a coherent timeline, intervention description and follow up account.[5] Photographs strengthen that account when they are linked to it. They do not transform a single uncontrolled observation into a comparative efficacy study. The appropriate conclusion is a hypothesis generating clinical course with clearly stated limitations.

A feasible standard for student and clinical reports

A practical protocol need not require expensive equipment. It should require a defined purpose, verified identity and date, an appropriate reference, a consistent view and preservation of originals. The clinical team should decide in advance which outcomes the images will support and which require separate examination. A simple reliable process is more useful than sophisticated software applied to inconsistent photographs. Feasibility should be assessed in the actual care environment, including who captures images and how consent and storage are

managed. The proposed workflow is a starting point for local development rather than a validated universal standard.

Future research can test the reproducibility of such a workflow and identify which capture variations materially change the intended outcome. Studies should distinguish technical image quality, measurement performance and clinical validity. These are related but separate achievements. A photograph can be technically clear yet unsuitable for a particular inference. The central question remains what the image can establish under documented conditions. Answering it carefully makes wound photography a stronger scientific tool and allows case reports to remain persuasive without claiming more than their records can support.

Photographic measurement needs an independently defined outcome

FDA wound product guidance distinguishes a clinical healing endpoint from intermediate changes in wound dimensions.[7] A photograph can contribute evidence about surface appearance, but it cannot by itself establish every element of the clinical endpoint. Sheehan and colleagues showed the prognostic value of early area change for later healing in the diabetic foot ulcer trial they examined.[8] A predictive relationship in that setting does not make area reduction identical to complete closure or validate the same threshold in every wound type.

The agreement between photographic measurement and another method should be examined directly. Bland and Altman explain why a strong correlation can coexist with clinically important differences between methods.[9] If an intraclass correlation coefficient is also reported, its particular model and definition should be specified.[10] These distinctions matter when two assessors trace the same image or when a new application is proposed as a replacement for an established measurement procedure.

CONSORT 2025 also makes the participant flow and availability of outcome measurements important to interpretation.[11] A photographic series should therefore identify missing visits, unusable images and reasons for exclusion. Choosing only the clearest or most favourable image at each stage may distort the apparent course. A prespecified acquisition and selection process is needed so that visual presentation reflects the assessed series rather than a retrospective choice of illustrative photographs.

Discussion

The strongest photographs are those collected through a simple consistent protocol, not those made more dramatic during figure preparation. Standardisation helps readers distinguish real change from capture variation. It also allows a manuscript to acknowledge uncertainty without discarding useful visual documentation.

This review does not validate a new image protocol or assess publication practices across journals. The proposed workflow requires adaptation to clinical circumstances and institutional policies. Its central principle is that the intended claim should determine the information collected at the time of photography.

Conclusion

Wound photographs can support clinical reporting when identity, timing, calibration and assessment are documented. They should not be used to manufacture missing measurements or infer unrecorded clinical findings. Their proper role is to strengthen a verifiable account of the wound course.

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