



TECHNICAL PROTOCOL FOR WOUND PHOTOGRAPHIC DOCUMENTATION: A TECHNOLOGICAL DEVELOPMENT STUDY*

PROTOCOLO TÉCNICO DO REGISTRO FOTOGRÁFICO DE FERIDAS: ESTUDO DE DESENVOLVIMENTO TECNOLÓGICO

PROTOCOLO TÉCNICO DEL REGISTRO FOTOGRÁFICO DE HERIDAS: ESTUDIO DE DESARROLLO TECNOLÓGICO

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RESUMO

Objetivo: Desenvolver um protocolo técnico para a padronização do registro fotográfico de feridas no contexto assistencial. **Método:** Estudo de desenvolvimento tecnológico conduzido conforme princípios do SQUIRE 2.0. Inicialmente, realizou-se busca estruturada da literatura para fundamentar parâmetros técnicos relacionados à fotografia clínica de feridas. Com base nas evidências identificadas, elaborou-se a versão preliminar do protocolo. Posteriormente, o instrumento foi submetido à avaliação técnica em ambiente controlado no Laboratório de Documentação Científica por Imagem de universidade pública brasileira. Foram analisados aspectos como posicionamento da câmera, distância, iluminação, enquadramento, uso de escala métrica, calibração de cores e armazenamento das imagens, com foco na viabilidade operacional e reprodutibilidade técnica. **Resultados:** A avaliação permitiu a simplificação das recomendações e ajustes para garantir a aplicabilidade prática no contexto assistencial. O protocolo final foi organizado em formato *checklist*, estruturado em três dimensões: preparação para o registro, ato fotográfico e armazenamento e segurança das imagens, visando a padronização, rastreabilidade documental e consistência técnica. **Conclusão:** O protocolo desenvolvido constitui uma ferramenta estruturada para a qualificação do registro fotográfico de feridas, contribuindo para a redução da variabilidade técnica e o fortalecimento da qualidade assistencial e da governança clínica.

Descritores: Ferimentos e Lesões; Fotografia; Documentação; Enfermagem; Melhoria da Qualidade; Governança Clínica.

ABSTRACT

Objective: To develop a technical protocol for standardizing photographic wound documentation in the clinical care context. **Method:** A technological development study conducted according to the SQUIRE 2.0 principles. Initially, a structured literature search was performed to establish technical parameters related to clinical wound photography. Based on the identified evidence, a preliminary version of the protocol was drafted. Subsequently, the instrument underwent technical evaluation in a controlled environment at the Laboratory of Scientific Documentation by Image of a Brazilian public university. Aspects such as camera positioning, distance, lighting, framing, use of a metric scale, color calibration, and image storage were analyzed, focusing on operational feasibility and technical reproducibility. **Results:** The evaluation allowed for the simplification of recommendations and adjustments to ensure practical applicability in the healthcare setting. The final protocol was organized into a checklist format, structured across three dimensions: preparation for documentation, the photographic act, and image storage and security, aiming for standardization, documentary traceability, and technical consistency. **Conclusion:** The developed protocol constitutes a structured tool for qualifying wound photographic documentation, contributing to the reduction of technical variability and the strengthening of care quality and clinical governance.

Descriptors: Wounds and Injuries; Photography; Documentation; Nursing; Quality Improvement; Clinical Governance.

RESUMEN

Objetivo: Desarrollar un protocolo técnico para la estandarización del registro fotográfico de heridas en el contexto asistencial. **Método:** Estudio de desarrollo tecnológico realizado siguiendo los principios del SQUIRE 2.0. Inicialmente, se llevó a cabo una búsqueda estructurada de la literatura para fundamentar los parámetros técnicos relacionados con la fotografía clínica de heridas. Con base en la evidencia identificada, se elaboró la versión preliminar del protocolo. Posteriormente, el instrumento fue sometido a una evaluación técnica en un entorno controlado en el Laboratorio de Documentación Científica por Imagen de una universidad pública brasileña. Se analizaron aspectos como el posicionamiento de la cámara, la distancia, la iluminación, el encuadre, el uso de escala métrica, la calibración de colores y el almacenamiento de las imágenes, con énfasis en la viabilidad operacional y la reproducibilidad técnica. **Resultados:** La evaluación permitió la simplificación de las recomendaciones y la realización de ajustes para garantizar la aplicabilidad práctica en el contexto asistencial. El protocolo final se organizó en formato de *checklist*, estructurado en tres dimensiones: preparación para el registro, acto fotográfico y almacenamiento y seguridad de las imágenes, buscando la estandarización, la trazabilidad documental y la consistencia técnica. **Conclusión:** El protocolo desarrollado constituye una herramienta estructurada para la cualificación del registro fotográfico de heridas, contribuyendo a la reducción de la variabilidad técnica y al fortalecimiento de la calidad asistencial y de la gobernanza clínica.

Descriptores: Heridas y Lesiones; Fotografía; Documentación; Enfermería; Mejora de la Calidad; Gobernanza Clínica.

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What is already known:

- Photographic documentation is widely used in wound monitoring, but it presents technical variability related to lighting, angulation, and framing.
- The lack of standardization compromises the serial comparability of the images and may affect the quality of clinical documentation.
- There is a gap in structured technical protocols aimed at nursing care practice in the Brazilian context.

What this article adds:

- The development of a structured technical protocol for standardizing wound photographic documentation, organized as an operational checklist.
- The integration of technical, ethical, and organizational aspects, contributing to the improvement of care quality and health information governance.
- The provision of an applicable instrument to reduce technical variability and strengthen documentary traceability in clinical practice.

INTRODUCTION

The systematic assessment of chronic wounds is an essential component of healthcare, particularly in nursing. The nurse plays a central role in the longitudinal follow-up of these patients⁽¹⁾. Clinical monitoring involves the analysis of dimensions, tissues present, exudate, borders, perilesional skin, and signs of infection, which support therapeutic decisions and reassessments of the care plan.

The use of standardized photographic documentation has become consolidated as a complementary tool to written documentation, allowing for serial comparative analysis, communication among professionals, support for teleassistance, and ethical-legal backing throughout the care process. Recent clinical studies and reviews emphasize the role of digital imaging as a means to capture changes in wound morphology and to support quantitative and qualitative assessments of healing evolution – especially when conventional methods heavily depend on the operator and exhibit variability in the precision and reliability of measurements⁽²⁾.

Technological advances have significantly expanded access to image-capture devices, particularly high-resolution smartphones, which represent a promising resource⁽³⁾. However, technological availability alone does not ensure technical quality or methodological standardization. Evidence indicates frequent inconsistencies in camera positioning, lighting variability, absence of metric scales, and failures in image documentation and storage, thereby compromising clinical reliability and information security⁽⁴⁾. This lack of consistent technical protocols for the photographic documentation of chronic wounds undermines both the quality of clinical records and the comparability of serial assessments across different healthcare professionals and services⁽⁵⁾.

In the literature, protocol-based care is understood as an approach that organizes and standardizes professional practice through previously defined structures, promoting consistency and quality of assistance processes, in addition to reducing variability in clinical practice⁽⁶⁾. Protocols aimed at executing procedures, such as the photographic registration of wounds, assume a technical character by establishing steps and parameters for their execution, contributing to the standardization of practice and the quality of clinical records, especially when based on structured image capture criteria⁽⁷⁾. In this sense, the term “technical protocol” is adopted in this study to designate instruments focused on standardizing the execution of procedures

through the definition of technical steps and parameters.

Beyond the technical standardization established by the protocol, wound photographic documentation involves ethical and legal dimensions. Obtaining informed consent, protecting sensitive data, and the institutional use of digital devices are emerging themes in the literature, especially in the context of the digitalization of clinical records and the integration of mobile health platforms⁽⁸⁾.

Despite the recognized importance of these elements, there are significant gaps in the literature concerning methodologically robust and validated protocols for standardizing wound photographic documentation within the nursing context. Specifically, studies that describe the development and prior testing of technical parameters before implementation in real clinical settings⁽⁹⁾.

Given this gap, it becomes necessary to develop a technological product that organizes recommendations based on scientific literature and submit it to technical evaluation in a controlled environment, with the objective of verifying its viability, technical consistency, and applicability in the care context.

Based on this premise, the present study aims to develop a technical protocol for standardizing wound photographic documentation in the care context.

METHOD

Study design

This is a technological development study with technical evaluation in a controlled environment, conducted according to the principles of the Standards for Quality Improvement Reporting Excellence (SQUIRE 2.0), aimed at the systematic description of interventions intended to qualify care processes⁽¹⁰⁾.

The study aimed to develop a technical protocol for standardizing wound photographic documentation in the clinical care context.

Context

The evaluation was carried out at the Laboratory of Scientific Documentation by Image of the Federal University of Minas Gerais (iLab-UFGM). This is an environment specialized in the capture and technical management of digital images.

The choice of this setting was justified by the possibility of rigorous control over the technical variables involved in photographic documentation, such as lighting, camera

positioning, image background, and color calibration. The control allows for the evaluation of the reproducibility and consistency of the proposed recommendations.

Technical protocol development

The protocol development occurred in two sequential and complementary stages.

In Stage 1 – Technical-Scientific Basis, a structured search of the scientific literature was conducted with the objective of identifying technical parameters related to wound photographic documentation. This stage was instrumental, aiming to support the initial drafting of the protocol.

International and Latin American databases were consulted, including MEDLINE/PubMed, Embase, Scopus, Web of Science, Cochrane Library, and LILACS, using descriptors related to clinical photography, wound documentation, and image standardization.

The identified studies were analyzed for recommendations regarding: camera positioning; distance and angulation; lighting; image background; use of a metric scale; color calibration; image storage and security. The findings were organized into preliminary technical parameters that constituted the initial version of the protocol.

Stage 2 – Protocol Evaluation in a Controlled Environment, consisted of submitting the preliminary version of the protocol to technical evaluation in a controlled environment, using wound simulators. The following were used: two wound simulators; institutional device for image capture; lighting system with LED sources; standardized background; auxiliary instruments for color calibration.

The evaluation aimed to: analyze the technical performance of the recommendations; test the reproducibility of the images; identify technical inconsistencies; adjust or suppress recommendations unfeasible in the care context.

During this stage, the recommendations were reorganized, adapted, or excluded according to criteria of practical applicability, clarity, and technical consistency. From this process, the technical protocol was consolidated and organized into an operational checklist format, structured across three sequential dimensions: preparation for documentation, the photographic act, and post-capture/storage. The checklist was developed with the objective of systematizing the technical recommendations, organizing them into clear steps.

Variables analyzed

In the controlled environment evaluation, the following technical aspects of the produced images were analyzed: sharpness and focus; lighting uniformity; color fidelity; centering of the area of interest; presence of a metric scale; and consistency across serial records. The analysis was descriptive and comparative between different technical configurations.

Data analysis

The obtained data were analyzed descriptively, considering the technical suitability of the generated images and the applicability of the proposed recommendations. The identified inconsistencies supported the consolidation of

the final protocol version.

Ethical considerations

As this was a technological development study conducted in a controlled environment, using wound simulators and data derived from scientific literature, with no direct involvement of human subjects, there was no need for submission to a Research Ethics Committee (REC), in accordance with current regulations.

For illustrative purposes of the protocol's applicability, a clinical image was used, which was previously authorized through a specific Informed Consent Form (ICF) for scientific use, without patient identification.

RESULTS

The technical-scientific foundation stage allowed for the identification of parameters related to the photographic documentation of wounds, initially organized into ten structural axes encompassing ethical, technical, and operational aspects. These parameters were grouped into three operational dimensions, structured sequentially, establishing a logical order of the steps to be followed for the proper performance of the photographic record.

1. Preparation for documentation
2. Execution of the photographic record
3. Image storage and security

The preliminary organization supported the construction of the initial version of the technical protocol (Table 1).

The technical evaluation conducted at the Laboratory of Scientific Documentation by Image (iLab-UFGM) enabled testing the applicability of the recommendations under controlled conditions of lighting, positioning, and capture (Figure 1).

During this stage, technical limitations were identified, primarily related to the use of professional photographic equipment, the complexity of color calibration, the use of a gray background, and the need to simplify the operational workflow.

The technical evaluation in a controlled environment allowed for the identification of operational simplification needs and adjustments to ensure the practical feasibility and reproducibility of the preliminary recommendations (Table 2).

Figure 2 presents an illustrative comparison between the photographic record performed without standardization and that obtained after applying the technical protocol, demonstrating differences related to angulation, framing, the presence of a metric scale, and lighting uniformity.

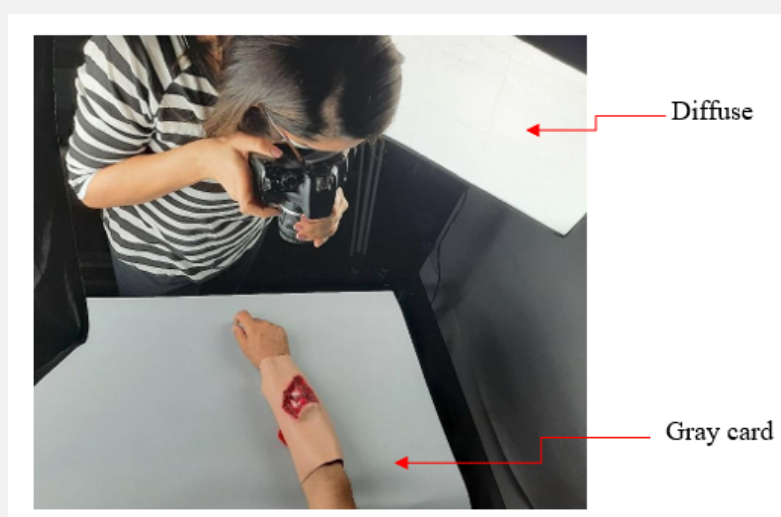
The consolidated technical protocol was organized into an operational checklist format, structured across three dimensions: preparation for recording, the photographic act, and post-capture/storage (Table 3). This organization aims to facilitate practical applicability in the care context and promote the standardization of serial records.

Table 1 - Proposed parameters and recommendations for wound photographic documentation. Belo Horizonte, MG, Brazil, 2022

Parameters	Synthesized technical recommendations
1) Informed Consent	Obtain a specific Informed Consent Form for photographic documentation, providing clarification regarding the intended use of the images.
2) Camera Positioning	Maintain a perpendicular angle (90°) to the wound and a standardized distance (20–30 cm), ensuring visualization of the involved limb and consistency across serial records.
3) Lighting	Utilize a uniform white light source, maintaining consistency across records. Control flash usage to prevent shadows and specular reflection. Ideally, use two light sources positioned at 45°.
4) Focus and Framing	Center the area of interest, ensure sharpness, and utilize optical zoom when necessary. For extensive lesions, capture multiple images while maintaining technical standards.
5) Image Background	Utilize a neutral and discreet background (preferably blue or white) to provide contrast with skin tones.
6) Identification and Scale	Include standardized identification and a graduated metric scale positioned near the lesion, without distorting or obstructing the area of interest.
7) Patient Preparation and Positioning	Perform prior wound cleansing, maintain the patient in an anatomical position, and avoid artifacts that may interfere with visualization.
8) Color Consistency	Maintain consistent imaging parameters; perform white balance calibration according to the equipment and, when possible, utilize a color reference card.
9) Equipment	Use standardized institutional equipment, maintaining the same configuration for serial records. Avoid the use of personal devices due to security risks.
10) Storage and Security	Save images to the institutional system, preserve quality (JPG, PNG, or TIFF), and ensure data protection and traceability.

Source: prepared by the authors, 2022.

Figure 1 - Controlled environment used for the technical evaluation of the protocol (lighting system, standardized background, and equipment positioning). Belo Horizonte, MG, Brazil, 2022



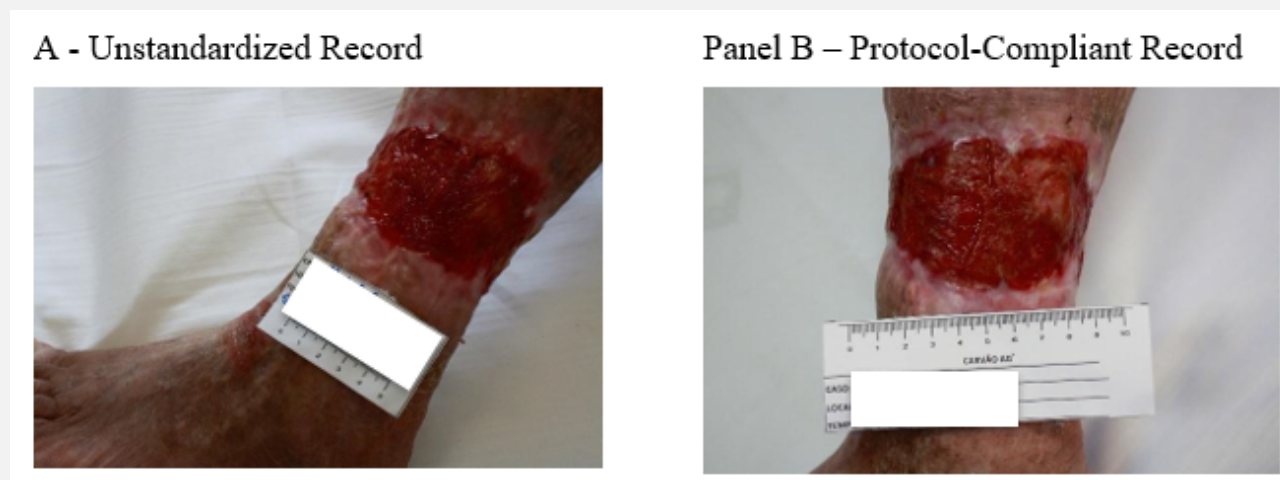
Source: authors' files, 2026.

Table 2 - Adjustments implemented following the technical evaluation conducted in a controlled environment. Belo Horizonte, MG, Brazil, 2022

Parameter	Preliminary Recommendation	Implemented Adjustment	Technical Rationale
Consent	Provision of Informed Consent Form (ICF) for documentation	Maintained without changes	Indispensable ethical-legal requirement
Camera Positioning	90° angle and 20–30 cm distance	Reinforced standardization; removal of additional distance variations	To ensure reproducibility and prevent angular distortions
Lighting	Use of uniform white light; possibility of flash; two sources at 45°	Recommendation for uniform white light; use of flash only when necessary; two sources indicated as ideal (not mandatory)	Operational simplification and feasibility in the care context
Focus and Framing	Multiple guidelines on zoom and depth	Synthesis focusing on central focus, sharpness, and preferential use of optical zoom	Reduction of technical complexity
Identification and Scale	Extensive detailing on ruler and identification	Operational synthesis maintaining mandatory scale and standardization	To facilitate practical application
Color Consistency	Mandatory use of gray card or color chart	Made an optional recommendation, according to institutional availability	Practical feasibility in different settings
Equipment	Inclusion of professional camera and cell phone	Exclusion of professional camera; prioritization of standardized institutional equipment	Technical complexity and low applicability
Storage and Security	Detailed guidelines on formats and copies	Synthesis maintaining quality preservation and institutional security	Focus on traceability and data protection

Source: prepared by the authors, 2026.

Figure 2 - Illustrative comparison of wound photographic record before (A) and after (B) application of the technical protocol. Image B shows standardization of perpendicular framing, presence of an adequately positioned metric scale, neutral background without artifacts, and uniform lighting (image is for demonstrative purpose of the protocol's operational applicability). Belo Horizonte, MG, Brazil, 2022



Source: authors' files, 2026.

Table 3 - Technical Protocol for Standardizing Wound Photographic Record – Operational Checklist. Belo Horizonte, MG, Brazil, 2022

Item	Technical Criterion	Verification (✓)
Section 1 – Preparation for Recording		
1	Use standardized institutional equipment	
2	Maintain the same camera configuration for serial records	
3	Ensure uniform white lighting	
4	Use a neutral background (preferably blue or white)	
5	Obtain specific Informed Consent Form (ICF) for photographic recording	
6	Perform prior wound cleansing	
Section 2 – Photographic Act		
7	Position the camera perpendicularly (90°) to the wound	
8	Maintain an approximate distance of 20–30 cm	
9	Center the area of interest	
10	Include the metric scale graduated in centimeters	
11	Position the ruler without pressing the skin	
12	Maintain the patient in an anatomical position	
13	Avoid artifacts (adornments, colored gloves, or shadows)	
14	Ensure focus and sharpness of the area of interest	
Section 3 – Post-Capture and Storage		
15	Save the image in the institutional system	
16	Maintain standardized image identification	
17	Use a format that preserves quality (JPG, PNG, or TIFF)	
18	Ensure data security and protection	
19	Avoid the use of personal devices	
20	Maintain technical consistency in subsequent records	

Source: prepared by the authors, 2026.

The checklist was structured to allow sequential application, promoting internal auditing and institutional quality control.

DISCUSSION

The standardization of wound photographic documentation, as proposed in this study, should be understood not merely as a technical refinement but as a structural strategy for quality of care and clinical governance. Variability in the capture of clinical images has been widely documented in international literature, showing inconsistencies related to angulation, lighting, framing, and the absence of a metric scale, factors that compromise the serial comparability and

reliability of evolutionary assessments^(1,11).

The lack of standardization in photographic documentation can lead to divergent interpretations among professionals, hindering clinical decision-making and the continuity of care. Recent studies on digital wound monitoring demonstrate that the technical quality of the image can influence the precision of tissue assessment and the measurement of the injured area^(3,12). Thus, standardization is not limited to aesthetics or documentary organization but constitutes a structural element for reducing inter-observer variability and strengthening clinical consistency.

From the perspective of clinical governance, standardized documentation protocols favor traceability, internal audit, and institutional transparency. The incorporation

of operational guidelines for photographic documentation helps to consolidate safe practices for the storage and protection of sensitive data, especially in a scenario of increasing digitalization of electronic health records and the use of mobile devices in care. The literature on digital health emphasizes that clinical information governance requires not only technological infrastructure but also clear standardization of data capture, storage, and sharing processes⁽¹³⁾.

In the Brazilian context, COFEN Resolution No. 554/2017 establishes guiding criteria for the use of images by nursing professionals, emphasizing ethical responsibility and patient identity protection⁽¹⁴⁾. However, professional regulation does not detail technical parameters for image capture, a gap that reinforces the relevance of the protocol developed in this study. By integrating technical, ethical, and organizational aspects, the protocol expands the discussion of clinical photography beyond the technological domain, inserting it into the field of patient safety and quality of care.

Another relevant aspect relates to operational feasibility. The exclusion of professional photographic equipment and the simplification of chromatic calibration recommendations reflect the need for adaptation to the care reality. Overly complex protocols tend to have low adherence and limited practical implementation. The literature on health process improvement indicates that sustainable interventions must balance technical rigor and contextual applicability⁽¹⁰⁾. In this sense, the technical evaluation in a controlled environment allowed for adjustments that favor feasibility without compromising methodological consistency.

The organization of the protocol in an operational checklist format also aligns with contemporary strategies for quality improvement, where structured instruments favor standardization, monitoring, and permanent education. Checklists have been widely used in patient safety to reduce variability and promote the reliability of clinical processes⁽¹⁵⁻¹⁶⁾. By adapting this logic to wound photographic documentation, the present study contributes to integrating clinical documentation and quality management. The proposed protocol does not replace the professional's clinical judgment but offers an organizational structure to qualify and standardize care documentation.

Although developed and tested in a controlled environment, the protocol demonstrates potential for implementation in real clinical practice settings. However, future studies should evaluate its applicability in different care contexts, as well as analyze indicators of adherence and impact on documentation quality.

The main limitation of this study refers to the technical evaluation being conducted in a controlled environment, using wound simulators. Although this strategy allowed for rigorous control of variables related to lighting, positioning, and framing, it does not encompass the complexity of real care scenarios, where environmental factors, structural limitations, and anatomical variability may interfere with

the protocol's applicability.

Furthermore, the study did not evaluate indicators of professional adherence or measure the impact on clinical outcomes or documentation quality in a care setting. The protocol was developed and adjusted from a technical perspective, and future investigation into its implementation in distinct clinical contexts and its incorporation into institutional systems is necessary.

The developed protocol offers a structured instrument for the standardization of wound photographic documentation, integrating technical, ethical, and organizational aspects. Its organization in a checklist format favors sequential application, internal auditing, and permanent education for the teams.

By proposing clear technical parameters for the capture and storage of clinical images, the study contributes to strengthening the quality of care, documentary traceability, and health information governance. The standardization of photographic documentation can support accreditation processes, patient safety, and continuity of care, especially in contexts of increasing digitalization of electronic health records.

CONCLUSION

The study enabled the development of a technical protocol for standardizing wound photographic documentation, structured based on scientific recommendations and adjusted to present feasibility in the care context.

The organization of the protocol in a checklist format favors its practical applicability, contributing to the reduction of technical variability, the strengthening of documentary quality, and the improvement of clinical governance processes related to health information.

Future studies should evaluate its implementation in real clinical settings and analyze indicators of adherence and impact on the quality of care documentation.

*Article derived from the Master's thesis titled "Photographic documentation of wounds using a mobile phone camera: a guide for clinical practice," presented to the Graduate Program in Nursing at the Federal University of Minas Gerais, Belo Horizonte, Minas Gerais, Brazil, in 2022.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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AUTHOR CONTRIBUTIONS

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Data collection: Souza POS, Leão AC, Borges EL.

Data analysis: Souza POS, Spira JAO, Borges EL.

Data interpretation: Souza POS, Leão AC, Spira JAO.

All authors are responsible for the textual writing and critical review of the intellectual content, the final version published, and all ethical, legal, and scientific aspects related to the accuracy and integrity of the study.



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