Journal of Health Informatics

J Health Inform. 2026;18:e1846
DOI: https://doi.org/10.59681/2175-4411.v18.iEspecial.2026.1846

ARTIGO COMPLETO
CBIS 2026

Irya: a digital health approach for structured pain documentation and medication management in palliative care

Irya: uma abordagem de saúde digital para o registro estruturado da dor e o gerenciamento de medicamentos em cuidados paliativos

Gabriel Medeia de Campos[1], Diego Henrique Costa de Souza[1], Jane C. Rodrigues Magalhães[1], Fábio Pires Itturriet[2], Renata Coelho Borges[2], Gisele Mara Silva Gonçalves[1], Juliano de Souza Gaspar[3], Wemerson Delcio Parreira[1] ✉

ORCID: 0009-0006-9163-0148 · 0009-0003-2313-3383 · 0000-0003-2910-0112 · 0000-0003-3140-2259 · 0000-0003-3259-5646 · 0000-0002-3480-5777 · 0000-0003-0670-9021 · 0000-0003-1896-0520

[1] Pontifical Catholic University of Campinas (PUC – Campinas), Campinas (SP), Brazil.

[2] Graduate Program in Biomedical (PPGEB-CT), Federal University of Technology of Paraná (UTFPR), Curitiba (PR), Brazil.

[3] Universidade Federal de Minas Gerais, Belo Horizonte (MG), Brasil.

ARTICLE INFORMATION

TYPE
Artigo completo · CBIS 2026

IDENTIFIER
e1846

DOI
10.59681/2175-4411.v18.iEspecial.2026.1846

RECEIVED
17 May 2026

ACCEPTED
20 July 2026

REVIEW PROCESS
Double Blind Review

HANDLING EDITOR
Juliano de Souza Gaspar

ACCESS
Open, CC BY 4.0

CORRESPONDING AUTHOR
Wemerson Delcio Parreira
wemerson.delcio@puc-campinas.edu.br

LICENSE

This is an open access article published under the Creative Commons CC BY 4.0 license, which permits use, distribution, and reproduction in any medium, provided the original work is properly cited.

CC BY 4.0

ABSTRACT

Objective: To describe the design and development of Irya, an ethically compliant and sustainable mobile health platform for structured pain documentation and medication management in palliative care within the Brazilian public health context. **Method:** A design-oriented methodological approach was adopted, integrating validated pain assessment instruments (Visual Analog Scale and Brief Pain Inventory) into a bidirectional mobile health (mHealth) system. The platform was developed using a cross-platform framework with a modular architecture, aligned with HL7 FHIR standards, national data models, and the Brazilian General Data Protection Law (LGPD), while prioritizing accessibility and low-literacy usability. **Results:** A high-fidelity functional prototype was implemented, enabling real-time patient self-reporting of pain and medication intake and providing clinicians with longitudinal visualizations and decision-support summaries through a web-based dashboard. **Conclusion:** Irya demonstrates the feasibility of an interoperable, accessible, and ethically grounded mHealth solution that supports equitable and sustainable digital transformation in Brazilian palliative care.

Keywords: Palliative Care; Mobile Applications; Clinical Data Modeling.

RESUMO

Objetivo: Descrever a concepção e o desenvolvimento da Irya, uma plataforma de saúde móvel eticamente adequada e sustentável para o registro estruturado da dor e o gerenciamento de medicamentos em cuidados paliativos, no contexto da saúde pública brasileira. **Método:** Adotou-se uma abordagem metodológica orientada ao design, integrando instrumentos validados de avaliação da dor (Escala Visual Analógica e Inventário Breve de Dor) a um sistema bidirecional de saúde móvel (mHealth). A plataforma foi desenvolvida com um framework multiplataforma e arquitetura modular, alinhada aos padrões HL7 FHIR, aos modelos de dados nacionais e à Lei Geral de Proteção de Dados (LGPD), priorizando a acessibilidade e a usabilidade para pessoas com baixo letramento. **Resultados:** Foi implementado um protótipo funcional de alta fidelidade, que permite o autorrelato da dor e do uso de medicamentos pelo paciente em tempo real e oferece aos profissionais visualizações longitudinais e resumos de apoio à decisão por meio de um painel web. **Conclusão:** A Irya demonstra a viabilidade de uma solução de mHealth interoperável, acessível e eticamente fundamentada, que apoia uma transformação digital equitativa e sustentável nos cuidados paliativos brasileiros.

Descritores: Cuidados Paliativos; Aplicativos Móveis; Modelagem de Dados Clínicos.

CBIS 2026 XXI CONGRESSO BRASILEIRO DE INFORMÁTICA EM SAÚDE

Paper presented at the 21st Brazilian Congress of Health Informatics (CBIS 2026), held from September 23 to 25, 2026, in Brasília (DF), Brazil, and published in the CBIS 2026 section of the Journal of Health Informatics.

HOW TO CITE THIS ARTICLE: de Campos GM, de Souza DHC, Magalhães JCR, Itturriet FP, Borges RC, Gonçalves GMS, et al. Irya: a digital health approach for structured pain documentation and medication management in palliative care. J Health Inform 2026;18:e1846. doi: https://doi.org/10.59681/2175-4411.v18.iEspecial.2026.1846

1 INTRODUCTION

Palliative care constitutes a specialized domain of healthcare dedicated to the comprehensive management of patients facing life-limiting illness, encompassing the early identification, rigorous assessment, and evidence-based treatment of pain and associated physical symptoms, with the overarching goal of preserving and enhancing quality of life throughout the disease trajectory [1-3]. Within this domain, collaborative practice among healthcare professionals plays a central role in delivering holistic, patient-centered care, integrating clinical, emotional, and social dimensions in alignment with individual patient values and preferences [4]. This field, though widely acknowledged as an essential component of comprehensive healthcare, continues to be marked by profound and persistent inequities in access, representing one of the most pressing and ethically significant challenges confronting global health systems today [2].

In this context, the emergence of digital health technologies introduces new possibilities to address such disparities through scalable, patient-centered, and data-driven approaches, while raising important ethical and sustainability considerations. Against this backdrop and the rapid emergence of new health-focused digital technologies, new opportunities are arising as viable pathways to both expand palliative care access and patient participation and engagement in self-directed care [2]. Within the field of Digital Health (or eHealth), the use of information and communication technology (ICT) supports patient-centered palliative care practices [5,6], enabling patients to use digital tools such as computers and mobile devices to register real-time self-reported data for analysis by multidisciplinary teams [3,4]. Furthermore, the use of digital media has shown quality-of-life improvements such as increased safety in medication consumption and reduced risk of overdose-induced intoxication [3,7]. However, professionals in the field have expressed concern about the use of these digital media for palliative care, as while eHealth offers many benefits, there are doubts about patients' access to technology and about establishing a stable, humane relationship via digital media [6]. These concerns are particularly relevant in the Brazilian healthcare context, where structural inequalities may intensify the digital divide and limit the reach of digital health innovations.

Within the domain of Digital Health, particularly focused on pain management, a notable deficiency persists in Electronic Medical Record (EMR) systems: the limited capacity to capture patient-reported pain data. This absence of systematic self-reporting creates a critical gap in clinical care, as pain is a uniquely subjective experience whose impact on daily life and quality of life can only be fully perceived by the patient. In palliative care settings, where in-person consultations with physicians occur every 1-2 months, the multidisciplinary team is left without a comprehensive longitudinal view of the patient's pain course [8]. Existing solutions in the field of Mobile Health (mHealth) fail to ensure universal accessibility across digital platforms, as compatibility constraints related to device manufacturers result in applications being available exclusively to Android or iOS users. Furthermore, evidence from studies shows that none of the existing solutions have fully addressed physicians' needs with respect to medically validated, evidence-based content [8]. These limitations raise concerns regarding interoperability, reliability, and long-term sustainability of such tools with the real-world healthcare system.

To address the identified gaps, we propose Irya, a bidirectional mobile application solution featuring a patient-facing interface designed to enable structured self-reporting of pain and medication use between in-person palliative care consultations, thereby enabling continuous mHealth-based clinical support through real-time physician access to patient-reported data. This solution is grounded in the structured modeling of clinical data and in a secure, modular, and scalable software architecture. To solve accessibility and equity issues across diverse user types, a cross-platform framework (Flutter) was adopted, thereby bridging the Digital Health Divide by ensuring consistent functionality and availability across both Android and iOS operating systems, regardless of device manufacturer [9-11]. The work further encompasses technical, clinical, ethical, and interoperability requirements, constituting a comprehensive and integrated contribution to the advancement of mHealth solutions within palliative care settings, particularly in the Brazilian context.

This study contributes as follows:

1. proposing an ethically compliant and LGPD-aligned mHealth solution for structured and longitudinal monitoring of pain and medication use in palliative care, supporting patient autonomy within the Brazilian public health context; and
2. adopting an accessibility-driven design approach aimed at reducing digital health inequities through intuitive and low-literacy-friendly interfaces.

2 METHODS

Developing digital tools in the field of Digital Health focused on palliative care requires extra diligence, as sensitive patient data is handled in pursuit of support that conventional methods fail to adequately provide [12]. In this context, preserving patient trust and continuous integrity with the digital process are paramount, demanding strict adherence to privacy regulations such as the Brazilian General Data

Protection Law (LGPD) [10,13], which functions not merely as a regulatory constraint but as a foundational ethical commitment to patient data. Equally imperative is the adoption of data interoperability standards, especially Health Level Seven (HL7) Fast Healthcare Interoperability Resources (FHIR), aligned with the national data model published by the Department of Informatics of the Brazilian Unified Health System (DATASUS) [14], to ensure that collected information can be meaningfully integrated into existing electronic health record systems. Within this architecture, patient-reported pain data is conceptually structured as FHIR Observation resources, while medication intake and prescription data follow the MedicationStatement and MedicationRequest resource patterns, supporting future integration with DATASUS-based electronic health record systems.

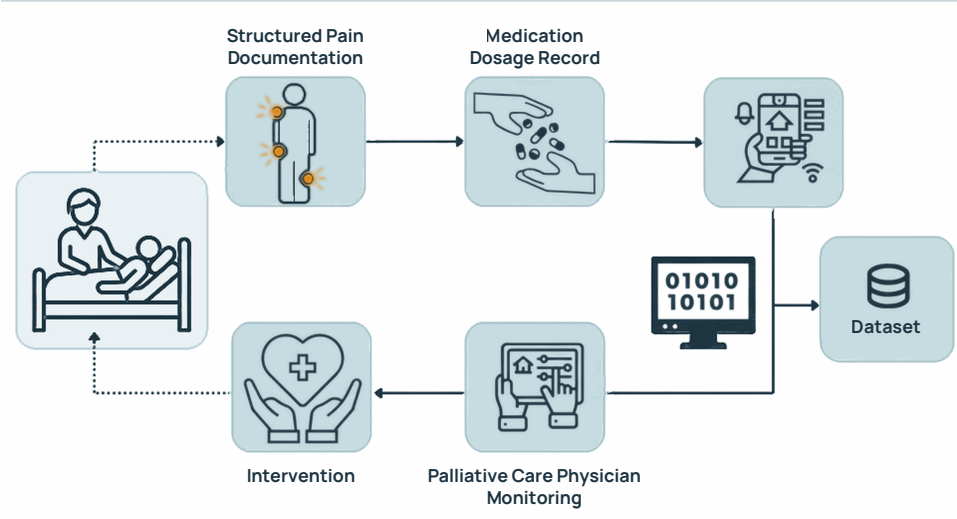
Extending the thought on complementing conventional methods, pain assessment represents one of the most significant limitations of conventional clinical methods, owing to the inherently subjective nature of the symptom itself [15,16]. The conversion of a patient's individual pain experience into structured, reproducible data requires the adoption of validated and widely recognized instruments. In this regard, the Visual Analog Scale (VAS), developed by Hayes and Patterson [17], and the Brief Pain Inventory (BPI) [18,19] are established and crucial tools that address this challenge by enabling rapid, standardized, and continuous data collection. Inadequate or inconsistent pain monitoring directly impairs multidisciplinary clinical communication and compromises the quality of informed decision-making.

Alongside data safety considerations, as emphasized by Girmay [11], the fundamental pillars of a successful digital health application are accessibility and equity. Digital solutions must be universally usable, accommodating people with disabilities (PwDs) as well as individuals with limited or functional illiteracy. These demands move away from text-heavy interfaces and go along with a more visually intuitive interface, as well as optional high-contrast layouts.

Addressing these demands (structured self-reporting of pain and medication usage, accessibility and equity, rigorous ethical data management, and humane patient interactions with digital tools) requires a scalable and modular architecture. Irya was designed to bridge all gaps in existing clinical workflows, offering a visual, simplified, and intuitive interface, capable of serving the full spectrum of patients encountered in palliative care settings, while actively reducing barriers, such as limited or functional illiteracy and visual impairment. Towards this end, an interactive body map is being implemented as the primary input mechanism, leveraging the logic of VAS for initial pain registration, subsequently complemented by the more detailed assessment provided by the BPI, a widely adopted instrument in current medical diagnosis. These design decisions were reviewed iteratively throughout development by a palliative care physician among the author team, ensuring alignment between interface choices and clinical practice.

From a technical standpoint, the Flutter framework emerges as the logical choice, as it simultaneously provides a modular and scalable architecture while ensuring universal and equitable access through a cross-platform development, enabling native code generation for Android, iOS, and Web from a single codebase. To further reinforce structured and quality architecture, the Model-View-ViewModel (MVVM) pattern is being implemented, which is widely used and accepted in current software development. This pattern promotes a clear separation between logic and user interface, resulting in a more modular, maintainable application [10]. Figure 1 represents Irya's data workflow.

Figure 1. Irya's data workflow



Source: Prepared by the authors (2026).

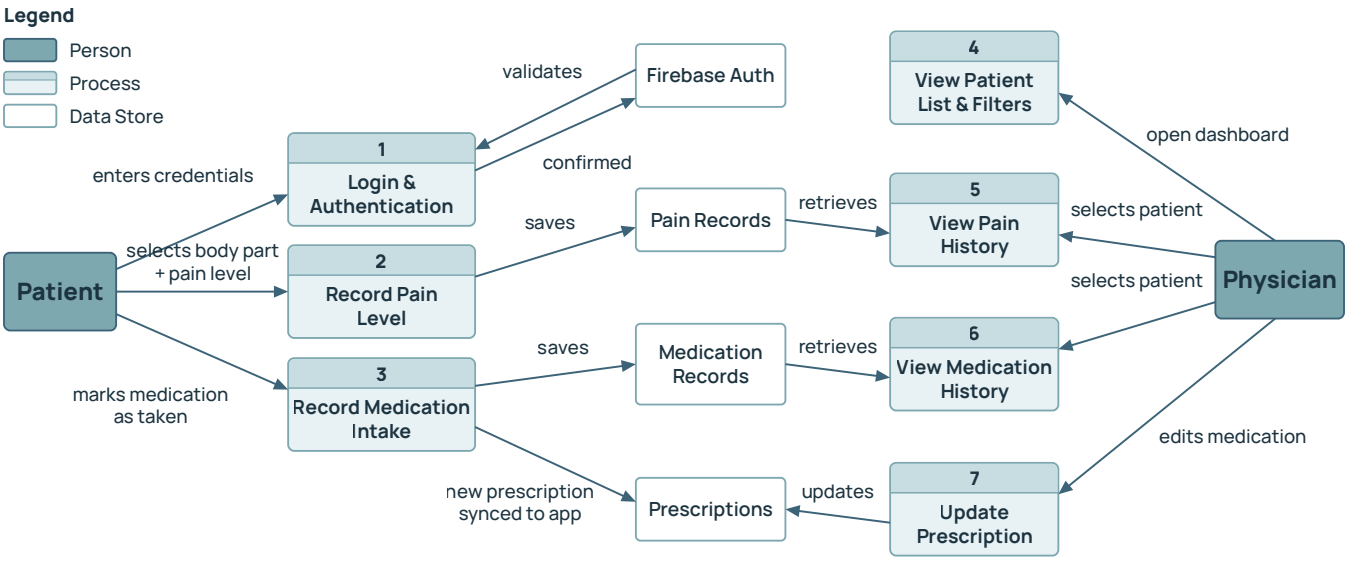
The physician-side interface was developed using Flutter for Web, a technological choice that enables rapid, modular, and platform-independent deployment while preserving a strict architectural separation from the patient-facing module. In palliative care, clinical decision-making depends critically on the timely interpretation of longitudinal symptom data; therefore, effective data visualization constitutes not merely a usability feature, but a fundamental clinical requirement [20]. Because this interface is primarily intended for the presentation and interpretation of structured clinical information, our design prioritized clarity, intuitiveness, and cognitive efficiency to reduce clinician workload during routine practice.

Multidisciplinary palliative care teams frequently monitor medium- to large-scale patient cohorts and consequently require concise yet information-dense visual representations capable of supporting rapid and accurate clinical assessment [20]. To address this demand, the proposed interface employs longitudinal bar charts to represent self-reported pain intensity and medication consumption over time, consistent with visualization approaches widely adopted in the literature for patient-reported outcome monitoring. These visual resources are complemented by automatically computed summary metrics, including mean pain score, peak pain intensity, percentage variation in pain levels relative to a previous reference period, and total medication consumption. All indicators are rendered dynamically according to physician-selected temporal windows of 7, 30, or 90 days.

Figure 2 presents the overall data flow architecture of the Irya system, providing a systemic view of the interaction between the patient-side application, the cloud-based backend infrastructure, and the physician-side dashboard. As illustrated, patient-generated data, including self-reported pain intensity and medication intake events, are transmitted in real time from the mobile application to the backend and securely stored via Cloud Firestore. These data are immediately made available to the attending physician, enabling continuous longitudinal monitoring of symptoms and treatment adherence between in-person consultations. This architecture supports low-latency synchronization while preserving data security and compliance with Brazilian data protection regulations.

Based on the data flow architecture illustrated in Figure 2, the core functional and non-functional requirements guiding the system design were defined and are summarized in Table 1. The table focuses on requirements with direct clinical, ethical, interoperability, and accessibility impact, which were identified as central to the sustainability and public health relevance of the solution. Secondary interface-level requirements were identified during development but are not listed for brevity. The following subsections describe how these core requirements were translated into prototype interfaces.

Figure 2. Data flow diagram of the Irya system



Source: Prepared by the authors (2026).

Table 1. Functional and Non-Functional Requirements of the Irya System

Category	Stakeholder	Requirement Description	Type
Pain Monitoring	Patient	Register pain intensity per anatomical region using an interactive body map and validated scales (VAS/BPI)	Functional
	Clinician	Access longitudinal pain history through time-series visualizations	Functional
Medication Management	Patient	Register medication intake based on physician-defined prescription	Functional
	Clinician	Update patient prescriptions with real-time synchronization	Functional
Ethical & Regulatory Compliance	System	Ensure LGPD-compliant data storage, processing, and role-based access control	Non-Functional
Interoperability & Sustainability	System	Structure and exchange clinical data using HL7 FHIR and national data standards	Non-Functional
Accessibility & Equity	Patient	Support low-literacy and impaired users through visual, low-text interaction mechanisms	Non-Functional
System Quality	System	Guarantee real-time data synchronization and responsive feedback for patient interactions	Non-Functional

Source: Prepared by the authors (2026).

The proposed architecture enables the immediate identification of clinically relevant trends and behavioral patterns without the need for manual data processing, thereby supporting evidence-based clinical decision-making and facilitating more proactive symptom management in palliative care settings.

3 RESULTS

A high-fidelity functional prototype was developed to represent the Irya system, which is currently under active development. The prototype aims to demonstrate how ethical, clinical, interoperability, and accessibility requirements can be operationalized within a bidirectional mobile health platform for palliative care.

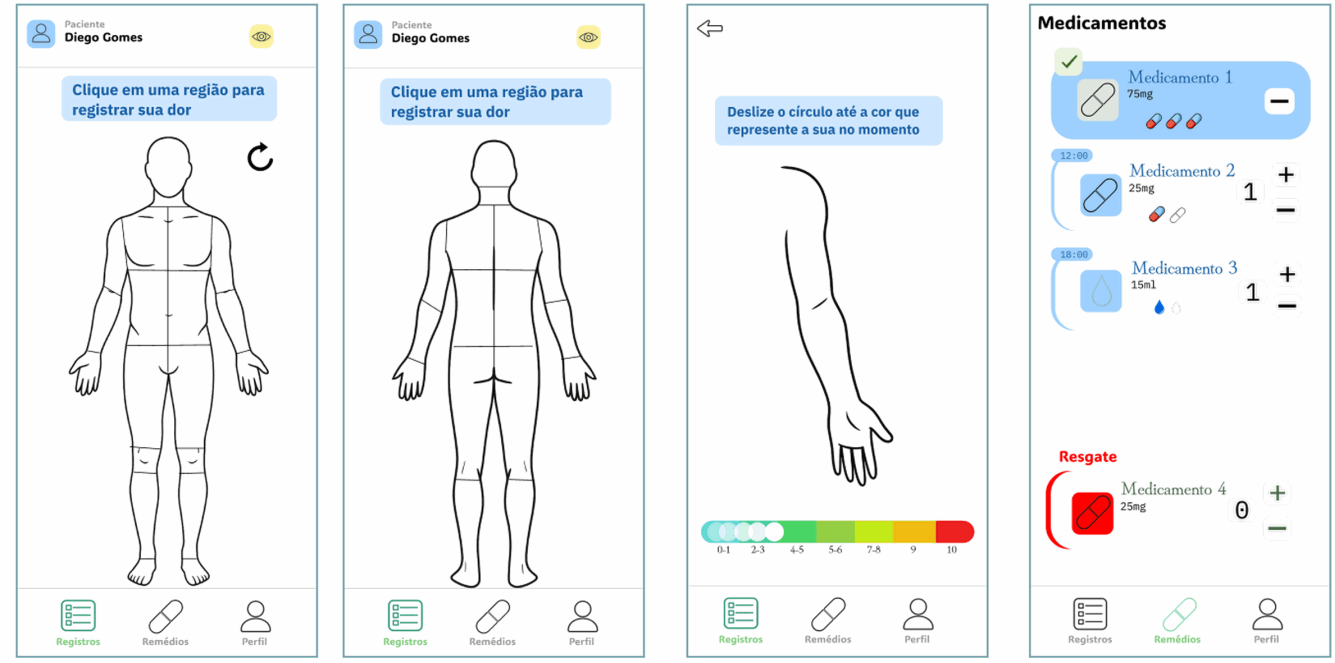
Building upon the requirements presented in Table 1, Figure 3 illustrates the patient-side interface, which constitutes the primary point of data generation in the Irya system. Upon login, the patient is presented with an interactive body map segmented into distinct anatomical regions, each corresponding to a specific body part, Figure 3a-c. By selecting a given region, the patient is prompted to register the perceived pain intensity using a color-coded VAS, ranging from blue, representing minimal pain, to red, representing maximum pain intensity, Figure 3c. This interaction can be repeated independently for multiple anatomical regions, enabling a detailed spatial representation of pain distribution.

To ensure clinically meaningful interpretation, the system allows patients to submit more than one pain report per anatomical region within the same day. In such cases, the physician-side dashboard displays the peak pain value recorded for that region, rather than the most recent entry, thereby preventing the underrepresentation of severe pain episodes that may be transient but clinically significant, Figure 4.

Medication management is presented through a complementary visual interface, depicted in Figure 3d. Each medication prescribed by the attending physician is displayed as an individual card, providing at-a-glance access to the medication name, dosage, and remaining quantity through an illustrative and low-text format. This design deliberately minimizes reliance on text-heavy interfaces, supporting intuitive comprehension of medication usage while promoting equitable access for patients with limited literacy.

By selecting a medication card, the patient is directed to a detailed view containing comprehensive information regarding usage schedule and administration instructions defined by the physician. Medication intake is recorded through a dedicated “+” interaction associated with each card. Upon reaching the maximum prescribed quantity, a visual confirmation indicator is automatically displayed. Recognizing the needs of users with motor impairments, such as patients with Parkinson’s disease, a persistent undo (“–”) option allows correction of accidental inputs. This design decision reflects a commitment to inclusive and universally accessible interaction design.

Figure 3. Irya's prototype patient-side interface



Source: Prepared by the authors (2026).

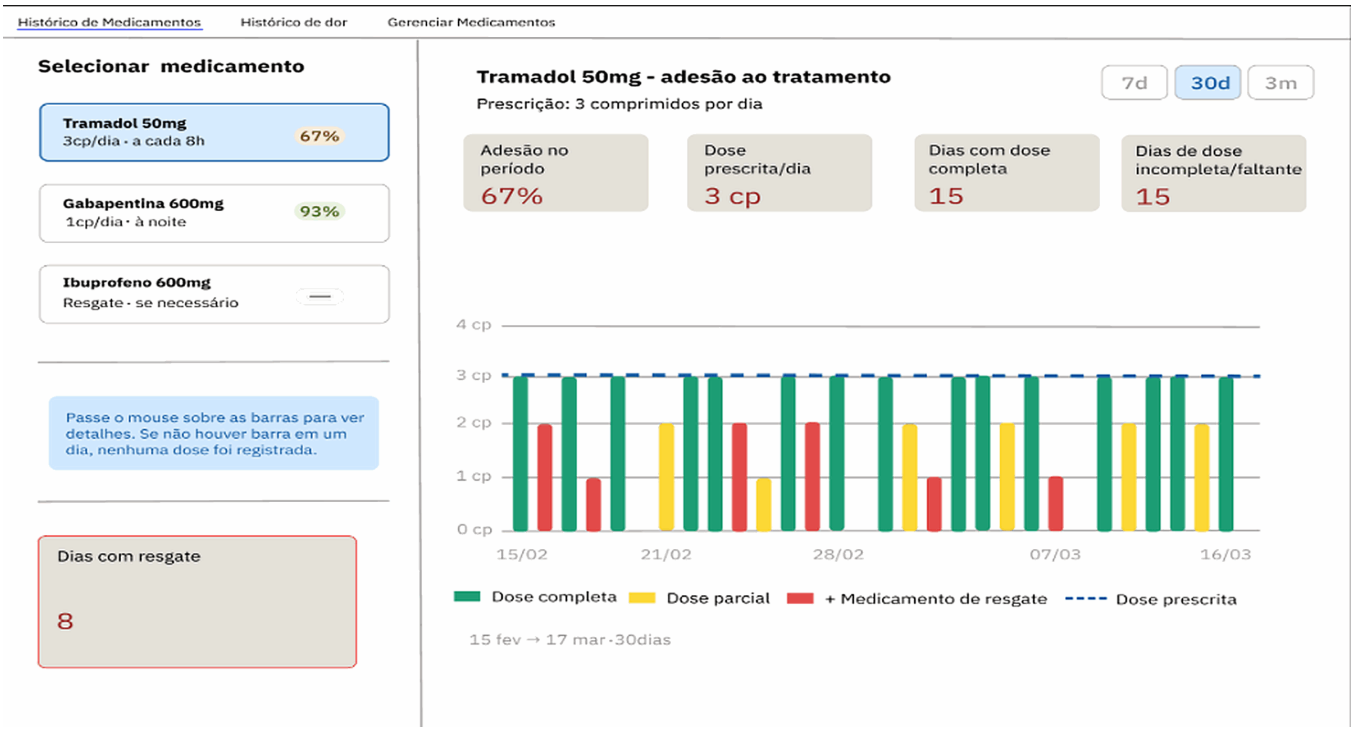
Complementing the patient-side application, Figures 4 and 5 present the physician-side interface, which consumes and aggregates the patient-reported data from Irya's prototype shown in Figure 3 and generated through the workflow depicted in Figure 2. The clinician dashboard provides two dedicated views: longitudinal pain history and medication usage history, both rendered as interactive bar graphs, an established visualization approach for patient-reported outcomes.

Figure 4. Irya's prototype pain history view (physician-side)



Source: Prepared by the authors (2026).

Figure 5. Irya's prototype medication usage history view (physician-side)



Source: Prepared by the authors (2026).

4 DISCUSSION

This study brings the conceptual design and development of Irya, a modular and patient-centered digital tool conceived to address critical gaps in pain assessment and symptom monitoring within palliative care settings. By integrating an interactive body map with validated clinical instruments (VAS and BPI) within an accessible and equity-oriented interface, Irya offers a structured approach to self-reported pain data collection that remains largely absent from current clinical workflows.

According to Figure 4, the colors used in Irya's prototype pain history view from the physician side correspond directly to those selected by patients during pain self-reporting. This semantic consistency facilitates intuitive interpretation of patient experiences without requiring additional contextual translation. Both dashboards are updated in real time, automatically reflecting newly submitted pain or medication intake events without requiring manual refresh by the clinician.

This design assumption, while grounded in established color-based pain visualization conventions, has not yet been formally validated through structured usability testing (e.g., think-aloud protocols or standardized instruments such as the System Usability Scale), and is identified as a priority for future evaluation, following methodologies applied in comparable palliative care mHealth usability studies [21].

The interface allows clinicians to inspect individual data points via hover interactions and select predefined temporal windows of 7, 30, or 90 days, as shown in Figure 5. Additionally, automatically computed summary indicators (such as mean pain score, peak pain intensity, percentage variation relative to a reference period, and total medication consumption by patient) are displayed to support rapid clinical assessment. These features were designed to reduce cognitive load and support evidence-informed decision-making in time-constrained clinical environments. Irya further enables physicians to modify medication prescriptions directly within the platform, with changes propagated in real time to the patient-side application (Figure 3d), establishing a closed-loop, bidirectional communication process.

From a broader discussion perspective, the design and implementation of the Irya prototype were conducted in accordance with a research protocol formally approved by a Brazilian Research Ethics Committee (BRET, protocol no. 92983825.0.0000.5481), ensuring compliance with ethical principles governing research involving sensitive health data. This approval provided a structured ethical framework that informed clinical assumptions, data handling practices, and interface design decisions throughout the development process. In practical terms, LGPD compliance was operationalized through role-based access control differentiating patient and physician credentials, encrypted transmission of pain and medication data between the mobile application and the cloud-based backend, and a data processing scope explicitly defined within the BRET-approved protocol. This protocol also formally includes a subsequent phase of evaluation involving Brazilian Unified Health System (SUS) patients and clinicians, for which the corresponding ethical

procedures, including informed consent, have already been approved and require no additional submission. Choices related to the longitudinal representation of pain, the prioritization of peak pain values, the visualization of medication intake, and the semantic consistency between patient-reported inputs and physician-facing data were guided by principles of patient safety, transparency, and non-maleficence that are central to palliative care. Although the present study focuses on system design and prototype implementation rather than on outcome evaluation, the BRET-approved protocol supports the clinical and ethical robustness of the proposed solution, consolidating Irya as an ethically grounded and methodologically sound digital health system aligned with Brazilian healthcare standards.

These design choices directly address limitations previously identified in the mHealth pain-management literature. Zhao *et al.* [8] reported that existing pain-management applications largely fail to incorporate medically validated, evidence-based content, while platform fragmentation across Android and iOS restricts equitable access. Irya addresses both limitations concurrently through its cross-platform Flutter architecture and the integration of clinically validated instruments (VAS, BPI) reviewed by a palliative care physician throughout development. Similarly, co-design approaches reported in other palliative care digital tools [21] reinforce the value of continuous clinical input during development. Unlike these studies, Irya's design review process at the current prototype stage did not yet include structured input from patients or caregivers as primary stakeholders; this evaluation, however, is not an unaddressed gap but a planned next stage already contemplated within the approved BRET protocol described above, ensuring continuity between the ethical framework governing the prototype and its forthcoming empirical validation with SUS patients and clinicians.

5 CONCLUSION

Irya was conceived to address the needs of both palliative care patients and physicians by unifying structured and intuitive digital tools into a cohesive platform capable of capturing the inherently subjective nature of pain, a dimension that conventional methods have consistently failed to adequately represent. Rather than replacing established clinical approaches, Irya is designed to function as a complementary tool, enhancing the clinician's understanding of each patient's individual pain experience.

The central design principle of Irya is the promotion of equitable access in clinical contexts in which communicating a phenomenon as subjective as pain remains particularly challenging. To this end, the platform moves away from text-heavy and information-dense interfaces in favor of intuitive, visually oriented interactions, leveraging validated instruments such as VAS and the BPI to transcend barriers imposed by illiteracy and disabilities, thereby advancing universal inclusion and accessibility contributing to improved patient quality of life. As a prospective extension of the prototype currently under development, Irya is envisioned to incorporate a range of optional, dynamically updating interface modalities, adaptable to varying levels of health literacy. These modalities are intended to span a broad representational spectrum, from image-based and emoji-driven visual interfaces designed for patients with limited literacy, to more descriptive and numerically oriented displays, positioning Irya as a highly adaptable and scalable digital health solution.

From the clinician's perspective, Irya addresses a critical and historically underserved need in palliative care workflows: the availability of structured, longitudinal, and real-time patient-reported data between in-person consultations. The physician-side interface was designed with clinical efficiency as a primary requirement, recognizing that multidisciplinary palliative care teams routinely manage medium-to-large patient cohorts under substantial time constraints. By consolidating self-reported pain intensity and medication consumption data into interactive bar graphs, updated in real time, the platform eliminates the need for manual data collection and retrospective reconstruction of symptom trajectories, enabling evidence-informed clinical judgment at the point of care. The automatic computation of summary parameters further reduces cognitive load during routine patient record review. Crucially, the semantic consistency between the patient and physician interfaces, notably the adoption of a shared VAS color scheme across both modules, supports accurate and intuitive interpretation of patient-reported pain data without requiring additional translation or contextual inference.

The platform additionally enables physicians to modify medication prescribing directly through the dashboard, with changes propagated in real time to the patient-side application, thereby establishing a closed-loop bidirectional communication channel between patient and clinician. This design reflects the understanding that effective palliative care depends not only on symptom monitoring but on the capacity for rapid, responsive therapeutic adjustment grounded in continuous, structured patient data.

Author contributions. The authors contributed equally to all stages of the article: conception and design of the study; data collection, analysis, and interpretation; drafting and critical revision of the manuscript; and approval of the final version.

Acknowledgments. This study was financed, in part, by the São Paulo Research Foundation (FAPESP), Brazil. Process Number 2025/13455-3, 2025/13465-9, and 2026/00132-4. This study was also financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES), Brazil.

Funding. The authors did not declare any source of funding.

Data and materials availability. The authors did not provide a data and materials availability statement.

Conflicts of interest. The authors did not declare any conflicts of interest.

Use of artificial intelligence. The artificial intelligence tool Claude (Anthropic, claude.ai) was employed to assist in the revision of this manuscript, specifically with respect to textual clarity, grammatical correctness, and formal academic register.

REFERENCES

1. Radbruch L, De Lima L, Knaul F, Wenk R, Ali Z, Bhatnaghar S, et al. Redefining Palliative Care-A New Consensus-Based Definition. J Pain Symptom Manage. 2020;60(4):754-64. doi: https://doi.org/10.1016/j.jpainsymman.2020.04.027
2. Tan Y, Liang X, Ming W, Xing H, Wang Y, Gao Y. A scoping review of digital technology applications in palliative care. BMC Palliat Care. 2024;23(1):290. doi: https://doi.org/10.1186/s12904-024-01626-w
3. Gamondi C, Larkin P, Payne S. Core competencies in palliative care: an EAPC White Paper on palliative care education – part 1. Eur J Palliat Care. 2013;20(2):86-91.
4. World Health Organization. Why palliative care is an essential function of primary health care (WHO/HIS/SDS/2018.39) [Internet]. Geneva: World Health Organization; 2018 [cited 2026 Oct 18]. Available from: https://www.who.int/southeastasia/publications/i/item/WHO-HIS-SDS-2018.39
5. Wantonoro W, Suryaningsih EK, Anita DC, Nguyen TV. Palliative Care: A Concept Analysis Review. SAGE Open Nurs. 2022;8:23779608221117379. doi: https://doi.org/10.1177/23779608221117379
6. Widberg C, Wiklund B, Klarare A. Patients' experiences of eHealth in palliative care: an integrative review. BMC Palliat Care. 2020;19(1):158. doi: https://doi.org/10.1186/s12904-020-00667-1
7. Allsop MJ, Taylor S, Bennett MI, Bewick BM. Understanding patient requirements for technology systems that support pain management in palliative care services: A qualitative study. Health Informatics J. 2019;25(3):1105-15. doi: https://doi.org/10.1177/1460458217740724
8. Zhao P, Yoo I, Lancey R, Varghese E. Mobile applications for pain management: an app analysis for clinical usage. BMC Med Inform Decis Mak. 2019;19(1):106. doi: https://doi.org/10.1186/s12911-019-0827-7
9. You D, Hu M. A comparative study of cross-platform mobile application development. Wellington, New Zealand; 2021. 66 p.
10. Richardson S, Lawrence K, Schoenthaler AM, Mann D. A framework for digital health equity. NPJ Digit Med. 2022;5(1):119. doi: https://doi.org/10.1038/s41746-022-00663-0
11. Girmay M. Digital Health Divide: Opportunities for Reducing Health Disparities and Promoting Equitable Care for Maternal and Child Health Populations. Int J MCH AIDS. 2024;13:e026. doi: https://doi.org/10.25259/IJMA_41_2024
12. Brasil. Ministério da Saúde. Departamento de Informática do SUS. Modelo padrão de dados (MAD) [Internet]. Brasília: Ministério da Saúde [cited 2026 Oct 18]. Available from: https://datasus.saude.gov.br/modelo-padrao-de-dados-mad/
13. Maguraushe K, Ndlovu BM. The use of smart technologies for enhancing palliative care: A systematic review. Digit Health. 2024;10:20552076241271835. doi: https://doi.org/10.1177/20552076241271835
14. Brasil. Lei nº 13.709, de 14 de agosto de 2018. Lei Geral de Proteção de Dados Pessoais (LGPD) [Internet]. Brasília: Presidência da República; 2018 [cited 2026 Oct 18]. Available from: https://www.planalto.gov.br/ccivil_03/_ato2015-2018/2018/lei/l13709.htm
15. Fink R. Pain assessment: the cornerstone to optimal pain management. Proc (Bayl Univ Med Cent). 2000;13(3):236-9. doi: https://doi.org/10.1080/08998280.2000.11927681
16. Xu X, Huang Y. Objective Pain Assessment: a Key for the Management of Chronic Pain. F1000Res. 2020;9. doi: https://doi.org/10.12688/f1000research.20441.1
17. Hayes MHS, Patterson DG. Experimental development of the graphic rating scale. Psychol Bull. 1921;18:98-99
18. Clark WC, Chokhavatia SS, Kashani A, Clark SB. Pain Measurement. In: Pain Management Secrets. [place unknown]: Elsevier; 2009. p. 42-52. doi: https://doi.org/10.1016/b978-0-323-04019-8.00006-8
19. Cleeland CS, Ryan KM. Pain assessment: global use of the Brief Pain Inventory. Ann Acad Med Singap. 1994;23(2):129-138.
20. Turchioe MR, Myers A, Isaac S, Baik D, Grossman LV, Ancker JS, et al. A Systematic Review of Patient-Facing Visualizations of Personal Health Data. Appl Clin Inform. 2019;10(4):751-70. doi: https://doi.org/10.1055/s-0039-1697592
21. Bonotis P, Angelidis P, Natsiavas P. Usability and User Experience Testing of a Co-Designed Electronic Patient-Reported Outcomes App ("MyPal for Adults") for Palliative Cancer Care: Mixed Methods Study. JMIR Hum Factors. 2025;12:e57342. doi: https://doi.org/10.2196/57342

EDITORIAL NOTES

The Journal of Health Informatics is a scientific journal maintained by the Brazilian Society of Health Informatics (Sociedade Brasileira de Informática em Saúde), a non-profit scientific association dedicated to the development of Health Informatics and Digital Health in Brazil. The editorial process is conducted with scientific independence, free from institutional, commercial, or sponsor interference, and follows international best practices in publication ethics.

This article was double-blind peer reviewed by specialists in the field. The editorial team used artificial intelligence tools, under human supervision, in the initial screening, in checking the text, references and numbers and, when needed, in redrawing figures, charts and tables, which the authors approved in the proof. The tools and safeguards are described in the journal's Policy on the use of artificial intelligence. Editorial decisions were made by people.

SBIS Sociedade Brasileira de Informática em Saúde